This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

LANE MEDICAL LIBRARY STANFORD
2 45 0163 4077

LANE

MEDICAL LIBRARY

SEAL OF THE LELAND STANFORD JUNIOR UNIVERSITY
1885

LEVI COOPER LANE FUND

OUTLINES

Of a Course of Lectures

ON THE PRINCIPLES AND PRACTICE

OF

SURGERY,

DELIVERED BY

E. GEDDINGS, M. D.,

PROFESSOR OF SURGERY IN THE MEDICAL COLLEGE OF THE
STATE OF SOUTH CAROLINA.

N.Y. Academy of Med'l Library,
DEC 12 1882
New York

PREPARED BY

Thos. S. Waring, M. D., and Samuel Logan, M. D.,

FROM NOTES TAKEN DURING THE COURSE.

PUBLISHED WITH THE CONSENT OF, AND REVISED
BY PROFESSOR GEDDINGS.

LANE MEDICAL LIBRARY
12962
SAN FRANCISCO

CHARLESTON:
S. G. COURTENAY & CO., PUBLISHERS,
No. 9 Broad Street.
1858.

Ka

Charleston, S. C.
STEAM-POWER PRESS OF WALKER, EVANS & CO.,
NO. 3 BROAD STREET.

121
G29
1858

Entered according to Act of Congress, in the year 1858, by
Drs. SAMUEL LOGAN & T. S. WARING,
In the Clerk's Office of the District Court for the District of South Carolina.

TO THE READER.

The following abstract of my Lectures on Surgery, consists of notes taken by my friends, Drs. Sam'l Logan and T. S. Waring, during the terms of their attendance upon the instructions of the Medical College of the State of South Carolina.

Under the impression that these notes might be useful, if published, to the numerous pupils resorting to our college, and interesting to many who have already received the instructions of its Faculty, they applied to me for permission to give publicity to the following abstract, which, after a perusal of their notes, I cheerfully granted.

In justice to myself, and to the Editors, I deem it proper to make the following explanation, without which, false expectations might be awakened, and erroneous conclusions formed.

1. My lectures are entirely extemporaneous, and are delivered without notes, and, as far as possible, in a simple colloquial style, so as to make the leading principles and facts of Surgical Science and Practice, easy of comprehension by the student.

2. They are abundantly illustrated, in every part of the course, by diagrams, drawings, specimens, models, apparatus, dissections, and demonstrations of the operative procedures on the dead body. I am aware that many parts of the following notes, for want of these illustrations, may appear meagre and unsatisfactory.

3. Owing to the great extent of the subjects to be discussed, it is my custom to vary the course every year, so that in one course, topics are often treated cursorily, or entirely omitted, which are fully treated in the next. Even with this arrangement, it seldom happens that the entire course can be completed in four months. This will explain the unequal character and fulness of the notes on different parts of the course, and the entire omission of particular subjects. These omissions, however, have been partly supplied by the Editors.

I take pleasure in stating, that the notes, as far as they extend, represent a fair and faithful exposition of the facts and principles of surgery, which it has been my endeavor to teach for several years. For the reasons assigned, they cannot be justly considered as furnishing a full copy of my lectures, and this it would be unreasonable to expect. I would wish to be considered only responsible for the facts and opinions. For the valuable notes and additions, as well as all other details pertaining to the work, all the credit belongs to the Editors.

Fully sensible of the glaring deficiencies of the work, as a whole, I nevertheless hope that it may prove useful to my pupils, as furnishing an outline of my course of lectures, which they can fill up while listening to my instructions, and that amongst our numerous *alumni*, it may recall associations upon which I, at least, shall always look back with pleasure. I have no ambition that it should aspire to any thing more.

E. GEDDINGS.

January, 1858.

66 George-st.

EDITORS' PREFACE.

By the publication of the following notes, the Editors hope to render an acceptable service to the profession, but more especially to the Medical Student.

To those who have heard Professor Geddings we must apologize, for offering this far from flattering portrait of him as a lecturer; while to the rest of the profession we need only say that our endeavor has been to represent him as faithfully as possible under the circumstances.

In the limited time appropriated to the delivery of the course, there were some subjects strictly within the limits of Surgery, which necessarily could not receive the attention due them. Desiring to make the work more useful, we have endeavored to fill up some of these omissions, and have been materially assisted in doing so, by Professor Geddings; who has made a good many additions to the text of some of the lectures, and has contributed the entire MS. of lecture No. VII. on Lymphatic Tumors and Lymphatic Abscess, and Lecture No. XI. on the Treatment of Mortification.

Such previously omitted subjects as did not require an extended notice, we have disposed of in the form of foot notes; while those which seemed to call for a more lengthy discussion we have considered in a few essays, which will be found inserted in their appropriate connections with the other portions of the work. For these essays, we are individually responsible, as our respective initials will indicate.

It will be perceived that the course is divided into *three parts.*

Part I. Is devoted to the discussion of those affections of a strictly *constitutional* character, which, though often resulting in local complications, are not necessarily confined to any particular tissue or locality, such as Inflammation, Syphilis and the like.

Part II. Refers to all those affections, accidents or operations, which appertain to certain *structures* or *tissues* only; these affections, operations, &c., being *particular in kind*, but occurring in many different portions of the human frame, such as fractures, aneurism, &c.

Part III. Comprehends all accidents, affections and operations of a *strictly local* character; this division being, as the Professor calls it, "*Regional* or *Topographical Surgery.*" Compression and concussion of the brain, ozena, hare-lip, tracheotomy, &c., &c., come under this head.

This division has been departed from in some few particulars, but will be found, with these exceptions, to obtain throughout. EDS.

TABLE OF CONTENTS.

PART I.

GENERAL SURGICAL DISEASES.

LECTURE I.

Inflammation..Its Phenomena..Division of Subject, &c.

LECTURE II.

Inflammation continued..Its Treatment..Venesection, &c.

LECTURE III.

Inflammation and its Treatment continued..Purgation..Mercury..Its peculiar action..Diaphoretics, &c.

LECTURE IV.

Inflammation continued..Its Products and Consequences..Exudation..Suppuration, &c.

LECTURE V.

Inflammation continued..Pus..Local and General Effects of Suppuration..Abscess, Acute and Chronic, or Hot and Cold..Treatment of Acute Abscess.

LECTURE VI.

Abscess continued..Chronic Abscess..Psoas Abscess, how distinguished from Hernia..Processes by which Abscesses Heal..Diet and General Treatment.

LECTURE VII.

Lymphatic Tumors and Lymphatic Abscesses..Their Causes, Symptoms, Results, and Treatment.

LECTURE VIII.

Ulceration and Gangrene..Analogy between them..Definition of Ulceration..Varieties..Treatment of Simple Ulcers.

LECTURE IX.

Ulceration continued..Various Modifications of the Ulcerative Process..Treatment.

LECTURE X.

Mortification..Its Definition..Varieties—Causes..Symptoms.

LECTURE XI.

Treatment of Mortification.

ESSAY No. 1.

Bedsores..Hospital Gangrene..Pyæmia.

LECTURE XII.

Erysipelas..Its Definition .. Varieties..Symptoms..Treatment of Erysipelas Vera.

LECTURE XIII.

Pseudo-Erysipelas..Treatment..Anthrax or Carbuncle..Its Causes, Symptoms, and Treatment.

ESSAY No. 2.

Syphilis..Primary Syphilis..Cause..Symptoms..Treatment..Consecutive Primary Syphilis..Secondary Syphilis..Symptoms, as Affecting Skin..Mucous Membrane..Bones..Organs..Infants..Treatment of Secondary Syphilis.

ESSAY No. 3.

Effects of Heat and Cold..Burns and Scalds..Frost Bite..Local Anæsthesia by Cold.

ESSAY No. 4.

Tumors..Their Varieties..Non-Malignant Tumors..Encysted Tumors..Mucous Tubercle..Warts..Corns..Polypi..Fatty Tumors..Fibro-Cellular and Fibrous Tumors..Malignant Growths or Cancers..Encephaloid Cancer..Scirrhus..Melanosis..Colloid Cancer..Epithelial Cancer.

PART II.

STRUCTURAL AFFECTIONS.

LECTURE XIV.

Fractures..Causes, Predisposing and Exciting..Varieties and Divisions of Fracture..Symptoms.

LECTURE XV.

Fractures continued..Process of Repair..General Principles of Treatment.

LECTURE XVI.

Fractures continued..Bones of the Nose..Malar Bone and Zygomatic Arch..Superior Maxillary Bone..Inferior Maxillary Bone.

LECTURE XVII.

Fractures Continued..Of the Vertebræ..Of the Clavicle.

LECTURE XVIII.

Fracture of Clavicle continued..Of Scapula..Of its Body..Acromion Process..Coracoid Process..Fractures of Humerus.

LECTURE XIX.

Fractures of Humerus continued..Fractures of Bones of Fore-arm..Olecranon Process..Coronoid Process.

LECTURE XX.

Fracture of Bones of Fore-arm continued..Head of Radius..Lower part of Radius, &c...Carpal Bones..Meta-Carpal Bones..Fingers.

LECTURE XXI.

Fractures continued..Of Os Innominatum..Of Femur in the Capsular Ligament..Outside of the Capsular Ligament.

LECTURE XXII.

Fracture of Femur near the Joint continued..Other Fractures of Femur.

LECTURE XXIII.

Fractures above and through the Condyles of the Femur, complicated with Inflammation of the Parts..Fracture of Patella..Fractures of Tibia and Fibula..Of the Bones of the Foot, &c.

LECTURE XXIV.

Complicated Fractures..Comminuted Fractures..Compound Fractures..Compound Comminuted Fractures..Treatment..False Joints..Treatment.

LECTURE XXV.

Dislocations Generally Considered..Of Inferior Maxillary.

LECTURE XXVI.

Dislocations continued..Of Clavicle..Humerus..Two Bones of Fore-arm Together..Radius and Ulna Separately.

LECTURE XXVII.

Dislocations continued..At Wrist-joint..Of Phalanges of Thumb and Fingers..At Hip-joint.

LECTURE XXVIII.

Dislocations continued..Of Patella..At Knee-joint..At Ankle-joint..Of Astragalus..Of Phalangeal Bones of Toes..Compound Dislocation..Dislocation concluded..Affections of, and Injuries to Joints..Wounds of Joints..Inflammation of Joints.

LECTURE XXIX.

Inflammation of Joints continued..Other Pathological Conditions of Joints, and their Treatment.

LECTURE XXX.

Diseases of Joints continued..Hip-joint Disease..Anchylosis..Its Treatment.

LECTURE XXXI.

Pathology of Osseous Structure..Inflammation of Bone, or Osteitis..Acute and Chronic..Common and Specific, &c...Results of Osteitis..Osteo-spongiosis..Osteo-sclerosis..Exostosis..Osteo-phyta..Atrophy of Bone..Osteo-pyosis..Medullary Abscess..Caries, or Osteo-elkosis..Necrosis..Tumors from Bone.

LECTURE XXXII.

Periostitis..Its Varieties..Nodes, &c...Results of Periostitis..Treatment of Osteitis, Periostitis, Necrosis, &c.

ESSAY No 5.

Generalities of Amputation..Cases which require Amputation..Period most favorable for Amputating..Most eligible point for Amputating..Comparative advantages of Amputating through the Continuity, and in the Contiguity of the Bones..Apparatus and Instruments to be provided..Means of commanding the Hemorrhage..Different methods of Operating..After Treatment.

LECTURE XXXIII.

Special Amputations..Of the Phalanges of the Fingers..Of the Meta-carpal Bone of the Thumb..Of the Wrist..Of the Fore-arm..At the Elbow..At the Shoulder..At the Meta-tarsal Joints.

LECTURE XXXIV.

Amputation continued..At the Ankle-joint..Of the Leg..Resection of the Bones at the Knee-joint..Amputations at the Thigh..At the Hip-joint.

LECTURE XXXV.

Wounds..Division of Subject..Simple Incised Wounds..Healing Process.

LECTURE XXXVI.

Wounds continued..Treatment of Simple Incised Wounds..Sutures..Sutura-sicca..Sutura-cruenta..Treatment of Contused and Lacerated Wounds.

LECTURE XXXVII.

Contused and Lacerated Wounds continued..Their Treatment continued..Punctured Wounds..Their Treatment.

LECTURE XXXVIII.

Gun-shot Wounds..Their Peculiarities.

LECTURE XXXIX.

Treatment of Gun-shot Wounds..Poisoned Wounds..Snake Bites, Spider Bites, &c...Their Treatment.

LECTURE XL.

Poisoned Wounds continued..Wounds from Rabid Animals..Hydrophobia..Its Treatment..Dissection Wounds..Glanders and Farcy..Wounds of Arteries.

LECTURE XLI.

Wounds of Arteries continued..Arteries completely divided..Obliteration of the Vessel..Collateral Circulation..Treatment of Hemorrhage.

LECTURE XLII.

Treatment of Hemorrhage continued..Application of Ligatures..Direct and Indirect Methods..Animal, Metallic, and Silk Ligatures..Other Methods of arresting Hemorrhage..Transfixing the Artery..Torsion..Actual Cautery.

LECTURE XLIII.

Aneurism..True and False Aneurism..Consecutive False Aneurism..False Internal Aneurism..False External Aneurism..Spontaneous and Traumatic, Circumscribed and Diffused Aneurism..Primary and Secondary Diffused Aneurism..Dissecting Aneurism..Fusiform, Sackiform, Cylindroid, and Cirsoid Aneurism..Arterio-venous Aneurism..Aneurism by Anastomosis, or Nævi Materni, or Telangiektasis..Causes of Aneurism.

LECTURE XLIV.

Pathology of Aneurism continued..Terminations of Aneurism..Treatment, Medical and Surgical..Pressure..Galvano or Electro-puncture..Acupuncture..Ligation.

LECTURE XLV.

Ligation of Arteries..Ligation of Common Carotid Artery..Of Arteria Innominata.

LECTURE XLVI.

Ligation of Arteries continued..Of Thyroid Arteries, Superior and Inferior..Of Lingual Artery..Of External Carotid..External Maxillary..Temporal..Of Subclavian Artery..Of Axillary Artery.

LECTURE XLVII.

Ligation of Arteries continued..Of Brachial Artery..Of Radial..Of Ulnar..Of Internal Mammary..Remarks on the Ligation of the Abdominal Aorta..Ligation of the External Iliac Artery..Of Common Iliac..Of Internal Iliac..Of Femoral..Of Posterior Tibial..Of Anterior Tibial.

LECTURE XLVIII.

Treatment of Aneurism continued..Telangiektasis, or Nævus Maternus, and its Treatment..Arterio-venous Aneurism at Elbow, and its Treatment.

PART III.

REGIONAL OR TOPOGRAPHICAL SURGERY.

LECTURE XLIX.

Divisions of Body..Injuries to Head..Wounds and Bruises of Scalp..Tumors on Head..Contusions on Skull.

LECTURE L.

Fractures of Cranium..Fissure..Incomplete Fracture..Fracture with Depression..Direct and Indirect Fracture..Fracture by Counter-stroke..Complicacations..Treatment.

LECTURE LI.

Concussion of the Brain..Its Causes..Symptoms..Treatment..Compression of the Brain..Its Causes..Symptoms..Treatment.

LECTURE LII.

Compression of the Brain continued..Epilepsy from Compression..Tumors in the Diploe..Operation of Trephining..Hernia Cerebri..Its Treatment.

ESSAY No. 6.

Diseases of the Ear..Otitis..Otorrhœa..Deafness.

LECTURE LIII.

Diseases of, and Accidents to, the Face..In its soft Parts..Wounds of Eye-lids..Of Cheeks..Paroted Fistula..Treatment..Tic Douloureux..Autoplastic Operations..Union of Excised Parts; Nose, &c...Injuries of the Bones..Mucous Fistula..Collections in Antrum Maxillare.

LECTURE LIV.

Affections, &c., of Nose..Ozena Scrofulosa and O. Syphilitica..Treatment..Polypous Tumors..Their Treatment..Hemorrhage from the Nostrils.

LECTURE LV.

Small Operations about the Face..Correction of Deformities of the Nose..Operation for Entropium..Ptosis..Ectropium..Hare-lip.

LECTURE LVI.

Operations about the Lower Lip and Cheeks..About the Mouth..For relief of immoveable Jaw..Excision of portion of the Superior Maxillary Bone.

LECTURE LVII.

Affections, &c., of the Tonsils, and in the Mouth and Throat..Hypertrophy of Tonsil..Its Treatment..Excision of Tonsil..Elongation of Uvula..Treatment..Cleft Palate..Treatment.

LECTURE LVIII.

Diseases, Operations, &c., about the Throat and Air Passages..Tracheotomy, Laryngotomy, &c.

LECTURE LIX.

Extraction of Foreign Substances from the Air Passages continued..Œdema Glottidis..Abscesses about these Parts..Serous Tumors..Goitre.

LECTURE LX.

Diseases and Accidents about the Thorax..Wounds and their Complications..Hemorrhage..Collapse of the Lung..Wounds of the Lung..Emphysema..Pleuritis..Empyema..Hernia Pulmonalis..Extravasation of Blood into the Cavity of the Pleura..Treatment of these Accidents..Wounds of the Heart.

LECTURE LXI.

Wounds about the Abdomen..Wounds, Simple and Complicated..Protrusion of Organs..Wounds of Organs and their Treatment.

ESSAY No. 7.

Operations about the Abdominal Walls..Paracentesis Abdominis..Puncture of the Urinary Bladder..Opening Small Intestines..Gastrotomy..Cæsarian Section..Ovariotomy.

LECTURE LXII.

Abdominal Hernia..Definition of Hernia..Inguinal Hernia..Crural or Femoral Hernia..Umbilical, Thyroid, Ischiatic, Perineal, Vaginal, Diaphragmatic Hernia..Hernia of the Linea Alba..Ventral Hernia..Intestinal Hernia..Epiplocele..Entero-epiplocele..Bubonocele..Oscheocele, or Scrotal Hernia..Reducible Hernia..Irreducible Hernia..Strangulated Hernia..Internal Stranulated Hernia..Causes of Hernia.

LECTURE LXIII.

Hernia continued..Its Differential Diagnosis..Inguinal Hernia..Scrotal Hernia..Thyroid Hernia..Phrenic Hernia..Treatment of Hernia..By Truss..Varieties of Truss.

LECTURE LXIV.

Hernia continued..Radical Cure of Incarcerated and Strangulated Hernia, and other treatment of same.

ESSAY No. 8.

Operations for Strangulated Hernia..Operation in General..Preliminary Considerations..Operative Proceedings..After Treatment..Special Operations..For Inguinal Hernia..For Crural, or Femoral Hernia..For Umbilical Hernia.

ESSAY No. 9.

Diseases, &c., about the Anus..Prolapsus Ani..Piles..Polypus Ani..Stricture of Anus and Rectum..Fistula in Ano..Recto-vesical and Recto-vaginal Fistulæ..Congenital Malformations.

LECTURE LXV.

Hydrocele..Its Varieties..Congenital Hydrocele..Causes of Hydrocele..Diagnosis..Treatment..Hydrocele of the Cord..Its Treatment.

LECTURE LXVI.

Varicocele, or Circocele..Its Symptoms and Treatment..Operation of Breschet..Method of Warren..Enlargement of the Testicle..Causes..Hematocele..Malignant Deposits in the Testicle..Fungus in the Testicle..Treatment..Castration..After Treatment..Results of the Operation..Diseases of the Penis..Phymosis..Its Results..Its Treatment..Paraphymosis..Results..Treatment.

ESSAY No. 10.

Diseases of the Genitals continued..Urethritis..Gonorrhœa..Sequelæ of Gonorrhœa..Impotence..Orchitis..Ophthalmia..Stricture..Diseases of the Prostate Gland.

LECTURE LXVII.

Calculus in the Bladder..Its Formation..Symptoms..Treatment..Lithotrity..The Instrument of Weiss..The Instrument of Jacobson.

LECTURE LXVIII.

Lithotomy..Operation of Frere Jacques..Operation as now performed..Calculus in the Female.

PART I.

GENERAL SURGICAL DISEASES.

LECTURE I.

INFLAMMATION—ITS PHENOMENA.

DIVISION OF SUBJECT, ETC.

Any full and accurate definition of Inflammation is impossible, although, in order to give some idea of the meaning of the term, we may say, that it is *an increased action of the vessels of a part of the Body, accompanied by a determination of blood, and an augmentation of the plastic element.* The Phenomena accompanying inflammation are—increased velocity of the blood—generally transitory; dilatation of vessels; retarded flow of blood; stagnation; oscillation; increase of plastic element, with exudation, and sometimes extravasation. The only true *termination* of inflammation is resolution; *its results are*—the exudation of various products, either organizable, or incapable of becoming organized; the former giving rise to new growths, as false membranes, &c.; the latter comprising pus, eliminated in the process of suppuration, tubercle, and various other hetorologous elements: ulceration, and grangrene. The phenomena presenting themselves, or *accompanying* inflammation, are—redness, swelling, heat, and pain. The *redness* is caused by the increased quantity of blood in the part, which produces an enlargement of vessels, the smaller vessels becoming filled with more blood, and the before invisible ones becoming thus evident. This redness also is sometimes caused, or increased, by the rupture of one or more small vessels, and the consequent exudation of blood into the cellular tissue. The *swelling* is caused by the increased size of the vessels;

and by exudation, at first of serum, next fibrin, and sometimes of blood by the rupture of vessels. The feeling of *heat* is very deceptive, for the thermometer fails to detect much more at the seat of inflammation than exists at the centre of circulation. The local increase of temperature may be explained by increased accumulation of blood in the part, and by the circumstance that all molecular changes going on in the body give rise to a process of chemico-vital action, by which heat is produced; and as all of these changes are found to go on more rapidly in the parts inflamed, a greater amount of heat may be evolved. The *pain* of inflammation, when not the result of nervous irritation, is caused by a stretching of the nervæ vasorum from a dilatation of the vessels. In inflammation, within certain limits of time and place, the vital energies are exalted, and nervous sensation is therefore rendered more acute. One of the first of the *local* effects of the inflammatory process is, a lowering of the cohesive power existing between the different particles of the inflamed structure. The *general effects* of inflammation are ascribed to *sympathy*: and sympathetic action may be divided into several varieties. First: we have a sympathy by the *continuity of surface*, as where stone in the bladder produces irritation and pain at the orifice of the urethra: next, that by *contiguity or proximity*, as where aloes acting on the rectum, excites action in the womb; next, that by *radiation* or by *nervous arrangement*, and by *metastasis*, as where Gout or Rheumatism, has, as is said in common language, "struck in." The general system becomes affected as soon as the local disturbance becomes sufficient to arouse the sympathies of surrounding parts; when, by reflex nervous action, such organ, or organs, as are most predisposed, are first attacked. Generally the heart's action becomes violent, the breathing hurried and broken, all the secretions of the body are disturbed, and thus all the phenomena of *symptomatic fever* present themselves. Local changes in the blood may exist to a certain extent, however, without disturbing the general circulation, and thus we may have a local inflammation without an inflammatory fever. Whenever the vital powers are lessened, the tendency of blood to aggregate is increased, vital force being necessary to keep up that repulsive energy by which the globules are kept apart; when therefore, the inflammation has gone on to the impairment of the vital energies of the parts, the blood congeals sooner than when the system is in a normal state. The *buffy-coat* is not exclusively found in inflammation, but sometimes accompanies the state of pregnancy, and it is also found in several diseases. Hence it cannot be considered as a certain index of inflammation. The *phenomena* of inflammation are always the same, however widely the *results* may differ. For convenience, the subject has been divided into several varieties. 1st, We have *acute* and *chronic* inflammation. The acute form ends in resolution, or runs its course very rapidly, and is characterized by an intense degree of activity; the chronic is slow and tardy in its progress, and the intensity of its action is less. 2ndly, We have *primary* and *secondary* inflammation; *primary*, where the effect follows directly upon the application of the cause,—as where inflammation follows as the direct result of a blow or a wound; *secondary*, where disease existing sometime previously, we are presented with local inflammation as a kind of epigenesis, as in the local lesions of typhus, or typhoid fevers, and typhoid pneumonia; though in this latter disease, the secondary stage is very early engrafted upon the primary. 3rd, We have *hypersthenic*, and *asthenic* inflammation; *hypersthenic*, where the constitution is strong and the health good, the fever in this case being high, the pulse full, the secretions perverted, and the skin turgid; while the asthenic form is generally found in weak and debilitated individuals, whose vital powers are in an enfeebled state, and is characterized by weak and tardy action, and a feeble and slow process of repair. In both of *these* forms of inflammation, the causes are the same, the results differing only on account of the different amount of vital energy existing in the respective subjects. In the one, the vital energies are perfect; the plastic elements of the blood are in their due proportion; and the system is able quickly to ward off the attack. In the other, the powers of life are at a low ebb; the blood is in a measure deprived of its plasma; all the acts of the organs are weak and enfeebled; and the system is only able to throw off the disease, after a long and a tardy process. The division generally known as the *paralytic*, is rather to be regarded as a kind of asthenic inflammation. It is the result of previous disease having so lowered the vital powers of an organ as to render it unable to resist the inflammatory process. Inflammation is again divided into the *common* and the *specific* variety; *common* inflammation caused by the action of common causes upon the body, such as an ordinary cold from exposure; *specific*, where the inflammation is engrafted on some previously existing diathesis,—such as the venereal or the scrofulous forms.

LECTURE II.

INFLAMMATION CONTINUED—ITS TREATMENT.

The first thing to be taken into consideration, in the *treatment* of inflammation is, the influence which may be exerted by surrounding circumstances. These, however, being of too general a nature to be discussed here, shall be spoken of as they may present themselves hereafter in each particular case.

As a general rule, the following indications should be fulfilled: *First*, the patient should be put in such a position as shall ensure perfect quiet, with the exclusion of all that may tend to increase action: mild diluent drinks should be administered; the diet should be mucilaginous, and unirritating; or, in other words, such measures should be adopted as shall best accord with what is known as the antiphlogistic regimen. *Secondly* are to be considered those means by which we moderate or subdue the excess of action. Among the agents for accomplishing this object, blood-letting presents itself as one of the most efficient; and this must be regarded under the two heads of *general* and *local* blood-letting. Both of these forms of depletion possess several advantages in common. By both the quantity of the circulating fluid is lessened, and the albumen and fibrin are diminished in proportion, the system being thus in a measure relieved of the excess of these stimulating protein compounds. The circumstances of each individual case must alone determine to which of these expedients we should resort.

In *venesection* several considerations demand our attention. The age, constitution, habits and condition of the patient must all be carefully inquired into; and the state of the atmosphere, its epidemic condition, &c., with all the other surrounding influences, should be considered. For example: should we be called to a patient of robust constitution and in the prime of life, whose breathing is oppressed, face flushed, skin hot and dry, pulse hard, frequent, and bounding, and whose secretions are deranged, we place him in a recumbent posture and bleed him from a large orifice until the pulse softens, the skin grows moist, the face becomes less flushed, and the breathing is composed. Should the symptoms return, the same course should be again pursued, and, if necessary, even a third time repeated. There has been, however, much difference of opinion with regard to the *posture* in which venesection should, under these circumstances, be performed. Many contend that the shock upon the system should be effected with the loss of as little blood as possible; and that hence the upright posture should be preferred, and blood drawn rapidly until fainting is produced. With this opinion we cannot concur, for we meet with some patients of so pusillanimous a nature, that scarcely is the arm tied up and the vein opened, than the face grows pale, the pulse gets weak, and fainting comes on with the abstraction of perhaps not more than an ounce of blood. The arm is then tied up, and you leave your patient; soon to be recalled, however, by a renewal of all his previous symptoms. The same process is then again gone over, with a like result; and thus we lose important time in vain endeavors even to mitigate the disease. Let the patient then be bled in the recumbent posture, until some notable effect is produced upon the disease; being always cautious, however, in examining carefully all the circumstances bearing upon each individual case; for, should typhoid tendencies exist epidemically, should the constitution be weak, or the habits bad, this would be found a dangerous remedy, and it should always be resorted to with great caution.

Where venesection is inadmissible, either from having been previously carried as far as was safe, or from other causes, we may frequently resort with advantage to local blood-letting, as by the use of cups or leeches; and here too we must have due regard to the circumstances, personal and incidental, of each particular case. Heretofore we have considered blood-letting as acting only as a depleting agent. We must not, however, overlook its efficiency through a different medium, for it acts also as a powerful revulsive. It is frequently desirable to keep up this revulsive action by the slow and repeated application of cups or leeches; and it may be well to state here, that where but few leeches can be procured, we may obtain very satisfactory results by bathing the bite or the bites with warm water, after they have fallen off; or by alternately bathing and applying cupping glasses.

LECTURE III.

INFLAMMATION, ITS TREATMENT CONTINUED—PURGATION—MERCURY, ITS PECULIAR ACTION—DIAPHORETICS, ETC.

At the close of the previous Lecture we were engaged chiefly in the consideration of the effects of blood-letting in inflammation. You will remember that three principal effects were pointed out as resulting from the use of this agent; viz: 1st, a diminution of the amount of blood in the circulation; 2nd, a change in the proportion of its constituents, the fibrin and albumen being lessened; and 3rd, *revulsion*—or that process by which blood is drawn from an inflamed part to some other portion of the body. Our attention will now be occupied by the other therapeutic measures. The first of these is *purgation;* and in the consideration of this agent, we must not confine our attention solely to its action as an evacuant. Purgatives certainly act effectually in emptying the alimentary canal of any irritative matters which may be contained therein; but in inflammation, by far the most favorable part of their action is to be ascribed to another cause. By rapidly increasing the secretion from the alimentary canal, they procure the evacuation of large amounts of mucus, serum, and bile; and thus draw largely upon the circulation—lessening the amount of the protein compounds of the blood, gradually, but surely and steadily. It is to be remarked, however, that, though in the main the action of all purgatives may be said to be characterized by the same results, yet when we come to consider the effects of each individually, we find that, in some respects, they differ widely. If, for example, a dose of some one of the salts be administered, large, copious, and watery stools will be produced, consisting chiefly of the *serous* portion of the blood. But if, on the other hand, a dose of mercury, alone or combined with some resinous cathartic, be administered, the excretions will be found, though not so copious as in the previous case, to consist chiefly of the *mucous* and *biliary* secretions. This, like the preceding purgative, acts indirectly upon the circulation. Notice, however, that here the constituents of the blood that are drawn off are different. In the former, serum chiefly was evacuated; in the latter, the albuminous and fibrinous portions are more particularly drained away. And here observe an important difference; for let it be remembered, as previously stated, that when the *latter* compounds become inordinately increased in proportion—which is a frequent result of inflammation—the blood becomes endowed with irritating qualities, which tend very much to keep up the inflammation. But depletion is not the only beneficial result derived from purgatives in the treatment of inflammation: as *revulsives* they also act promptly and powerfully, irritating the extensive secreting surface of the alimentary canal, and thus, upon the principle "ubi irritatio ibi fluxus," inviting the blood from distant and congested organs. To accomplish this end, a sufficient dose should be given to act promptly and effectually, the amount being determined by the condition of the patient. Where, from previous treatment, the patient is weakened, we should not entirely desist, but keep up the revulsion by the administration of small doses repeated at certain intervals; and advantage may here be gained by the alternate use of mercury, and some one of the saline or oleaginous cathartics. In controlling inflammatory action, however, the effect of mercury must not be attributed to revulsion and depletion only. This agent appears to be endowed with certain powers of controlling inflammatory action but little understood, and peculiar to itself. Being rapidly absorbed, and conveyed through the circulation to the most minute organic elements, it there so restrains and modifies their capillary action as to *check* inflammation and prevent the formation of false membranes. If blood be examined, even before the supervention of ptyalism, it will be found to have decreased in its protein compounds—in albumen especially, and in fibrin to a great extent. It is through this action of mercury that it prevents the formation of false membranes—nay, often causes them to be removed if already formed. This peculiar action of mercury may be especially observed in venereal iritis. To obtain its good effects, it may often be advisable to restrain its purgative tendency by the use of some astringent or narcotic, opium being the agent generally resorted to for this purpose. It may appear paradoxical thus to recommend in inflammation the use of agents whose primary action is stimulant; but let it be remembered that their effect is *to lessen the sensibility of the part*, and thus to render it less liable to be affected by *other stimuli.* When given with mercury, opium prevents the irritation of that agent, allowing it to be kept a sufficient length of time in contact with the surface of the stomach and intestines to be taken up by the absorbents. The skin, presenting an extensive secreting surface, through which foreign matters may be eliminated, demands also some attention here; and the class of diaphoretics present us with useful means of combatting inflammation. Those agents should be selected whose action is not stimulating; and their effect should be increased by the administration of diluents, and the application of warmth. Antimonials and other nauseates will be found very useful.

These constitute the general means, by which we strive to subdue inflammation. The local treatment, however, is also of some importance.

It will be frequently found advantageous to apply leeches directly to the inflamed part, though this should not always be done. There are also other means to which we may resort; but in the majority of cases there is nothing better than the simple water dressing; warm or cold water being used as the feelings of the patient may prescribe. Much too depends on the situation. If on the surface, cold may be applied by placing on the spot thin pieces of brown paper, moistened frequently with water from a sponge. Should it be desired to keep up a continual flow of water, one end of a pledget of thread may be placed in a basin of water, and the other left hanging over the part, which may be thus kept moistened by means of the capillary attraction of the threads. If a continued stream be desired, an elastic tube may be used instead of the thread, the stream being controlled by a stopcock. Warmth may be applied by means of cloths, fomentations, or poultices. Notwithstanding the latter have been characterized by Liston as "dirty, nasty, applications," and others have applied them so long as to prevent healing, by continually destroying the epidermis, yet they may be regarded as useful agents *when properly employed.*

These constitute our means for combatting hypersthenic and acute inflammation, and each of these means may be resorted to with advantage in appropriate cases. The treatment of asthenic and chronic inflammation will be discussed as they present themselves in each particular case.

LECTURE IV.

INFLAMMATION CONTINUED—ITS PRODUCTS AND CONSEQUENCES, EXUDATION, SUPPURATION, &C.

I mentioned, some time ago, that inflammation gave rise to several products and consequences. The first of these to be considered is *exudation*. We have seen, that as soon as a stasis or a retardation takes place in the current of the circulation, important changes go on in the blood itself, and certain of its component parts are exuded. The nature of this exudation is exceedingly diversified, varying in quantity according to the length of time the inflammation may have existed, the intensity of action, and the constitution of the patient.

In weak conditions of the system, when the inflammatory action is low, the exuded fluid may consist solely of serum. The fluid in this state is of a light straw color, and although coagulable by heat, in consequence of its containing some albumen, at the ordinary temperature of the body it remains fluid. But in ordinary inflammatory action the exudation consists of several different constituents, fibrin, albumen, and serum being together exuded. When first exuded the substance is of a liquid consistence. In consequence, however, of peculiar inherent properties, and also in consequence of the vital energy of the surrounding parts, it soon evinces material changes; and allow me here to remark, that we have now under our eye all those mysterious processes by which highly important ends are gained—the restoration of parts, the organization of structure, &c., and that the material which forms the foundation of all this is the *coagulable lymph*, or *blood plasma*, as it is called. In what then do these changes consist? In this. The exuded liquid gradually congeals, forming a simple homogenous and hyaline mass presenting at this period nothing like *growth*. Soon, however, minute *granules*, or dust-like specks, begin to appear, and they gradually increase and congregate. Next, these spots become surrounded by a thin and delicate membrane, containing a liquid; and this is the process of cell-growth, by which all living structure is formed. The plasma, at this stage of development, is called by anatomists the "Blastema." The small granules are adherent to the internal surface of the cell membrane, and are called "*nuclei*;" and within these are still smaller granules or "nucleoli." Chemical agents may dissolve this membrane, and resolve the nuclei into nucleoli by destroying the connecting medium between the latter. Here we have the foundation of all development. Wherever cells begin to appear, if their growth be uninterrupted, some structure, more or less organized, will be produced. By this process parts are restored, and in this way all tumors grow. It is not my purpose on the present occasion fully to discuss this subject, or to follow it to its ultimate points. It will be considered more particularly when we come to discuss the pathological growths and the healing of wounds.

The second consequence of inflammation, of which we shall now treat, is *suppuration*. In all works on pathology, we find suppuration laid down as one of the terminations of inflammation. The only true *termination* of inflammation, however, as formerly stated, is *resolution*. Suppuration, then, must be regarded rather as one of its results; and it is that process by which the peculiar fluid called "pus" is formed. This must be studied with regard to its *properties*, to the *manner* of its *formation*, and to its *subsequent changes*. When minutely examined, it is found to possess many properties in common with blood. It is a liquid of an opaque cream color, of a viscid consistence, and whose specific gravity varies. When exposed in a vessel it coagulates like blood, the lower portion, consisting of pus corpuscles and granules, and the supernatant fluid, the liquor puris, being more or less transparent and serous, frequently containing also some accidental constituents. Upon a chemical analysis, its constituents are found to be identical with those of blood. The pus corpuscles differ, however, in many essential points from those of the blood. They are for the most part larger, and present some striking peculiarities. Still they are of the same fundamental type, as the organic cell, a cell containing a nucleus and nucleolus. But the cell-membrane is so opaque as almost to obscure the nucleus; and, instead of being smooth and even, it is irregular and granular on its outer surface. If acetic acid be applied, the membrane will become clear and transparent, and the nucleus will be distinctly seen. So that, making some allowance for the irregularity and opacity of its membrane, we find that in fundamental structure there is a striking analogy. If by means of some chemical re-agent the mass be broken down, besides the proper pus-cells, small granular particles will be perceived differing widely from them. These, under the microscope, are found also to be cells. They have been called the "pyoid," or granular-cells. They are smaller than the true pus-cells, nor do they present the same internal arrangement. In an inflamed part we may find pus-cells and organic-cells intermingled, the proportion of each being dependent upon various circumstances, such as the stage of the disease, the intensity of action, the nature of the inflammation, and the predisposition to take on one or other form of action.

In the ordinary process of inflammation, as a general rule, pus is formed. This, however, is not always the case; for example, in the ordinary adhesive inflammation accompanying the healing of simple wounds. In diphtheritic inflammation, on the other hand, there are *often* found—depending upon the peculiar nature of the inflammation—pus-cells scattered throughout the membrane, and presenting certain pathological conditions.

How, then, shall we explain the formation of pus? We have traced its origin to exudation; we have observed that however much its cells may differ from the organized cells in their fundamental structure, yet in their chemical constituents they are the same; and we find that when traced to their results, they differ widely; the one, under favorable circumstances, becoming organized, the other never, and whenever found, being always to be regarded as extraneous. Here we have a fundamental distinction. Whenever purulent matter is thrown out into the substance of an organ, it at first consists of a number of globules, cell-granules, &c., diffused through the cellular tissue of the part. There is, in the conservative powers of nature, a disposition to the collection of these into a circumscribed mass, forming what has been known as *abscess*. Abscess may then be described as a *collection of pus in the substance of an organ.* Were it not for certain changes, pus would tend to diffuse itself widely, and thus lay the foundation of much mischief. Nature, however, wisely provides against this difficulty; for, as soon as pus is formed, by its very presence it keeps up a state of irritation, and plastic, organizable lymph is thrown out, which renders the areolar texture impermiable, and forms a membrane around the pus; so that the only mode by which the abscess can extend is by pressing upon and distending this membraneous wall. At this period, the abscess is said to be "*circumscribed.*" But this is not all. The pus in the abscess continuing to press more and more on the internal surface of the membrane, this becomes smooth and polished: and from its having been formerly supposed to possess the power of taking upon itself the formation of pus, this membrane has been termed the "*pyogenic* *membrane.*" The formation of this membrane interferes greatly with the healing of chronic abscess; and hence also the difficulty in fistulas, &c.

By certain conservative powers inherent in the organ, a tendency to elimination is produced. If the abscess is near the external surface, the intervening portion is gradually broken down and absorbed and the abscess is thus emptied. If it is nearer one of the cavities of the body, by the same process, it is emptied there. The formation of pus does not, however, take place in cellular tissues alone. It is often found on the mucous and serous membranes of the body, the skin, &c.; and is always seen on granulating surfaces, being thrown around and serving to protect the granulations from external injury. Sometimes it happens that pus is formed deep in the tissues, and cannot find its way out of the system by any orifice. Here, then, nature avails herself of other resources; for through the absorbents the pus is taken up, carried into the circulation, and, by way of the various secretions, is thrown out of the system. Here, however, I must not lead you into error. Do not think that the *purulent matter* actually enters the blood—as pus it can never be absorbed. The pus cells, granules, &c., must be broken down, reduced to a liquid state, and resolved into their primitive elements; for it is only after this change has been effected that the material can be acted on by the absorbents. The question here again recurs, how is pus formed? I presume that it is produced by the same process by which organized cells are developed, circumstances only modifying the results in the two cases. Exudation having taken place, and the vital powers being either below their healthy standard, or perverted in their action, the globules take upon themselves the character of pus-cells. In other words, it is an *abortive attempt at cell formation.* These cells are unfit for any of the purposes of the constitution, and are, therefore, extraneous matter requiring elimination.

LECTURE V.

INFLAMMATION CONTINUED—LOCAL AND GENERAL EFFECTS OF SUPPURATION—ABSCESS, ACUTE AND CHRONIC, OR HOT AND COLD—TREATMENT OF ACUTE ABSCESS.

In our remarks made yesterday, we stated that inflammation, and the subsequent formation of pus, may take place either on the surface, or in the substance of an organ. We discussed the essential nature of pus; and I will take this occasion to remark, that our observations were intended to refer exclusively to healthy or *laudable* pus.

When we consider inflammation in all its phases, we cannot be surprised to find that its products are as various as the shades of action on which they depend. When the surface is intensely inflamed, there is, in the exudation, a great preponderance of fibrin, tenacious, and hard to remove. Again, we sometimes find the serous membranes, the pleura, &c., in a state of inflammation, simulating suppuration; but if the fluid be examined with the microscope, it will be found to contain no pus globules, or very few, and to be composed, for the most part, of serum with fibrin, which coagulates and is diffused in the form of granular cells, or of floculi, through the fluid, causing it to assume the purulent appearance. Again, in weak and broken down states of the constitution, we find the fluid poured out in inflammation to be of a grey and dirty color, thin, and sometimes offensive, containing but few pus globules, and presenting very much the appearance of water in which meat has been washed. To this fluid we give the name of "sanies." There is a fact connected with this *sanies*, of which you should be apprised. It appears to dissolve, or erode the living textures with which it comes in contact. In the treatment of ulcers you will often find, that although for several days all appears to go on well, granulations springing up, and the healing process appearing to go on, the secretions still remaining are in an unhealthy state. Suddenly they become sanious; in a short time the granulations are broken down and dissolved; and every effort at healing will be vain, until the system is brought to a proper state, and the secretions reduced to their healthy condition. I have already remarked, that in those pseudo-membraneous deposits arising from inflammation, you will find that while the fibrin becomes organized, a greater or less number of pus-cells may be found disseminated through it, and that these false membranes, having attained a certain degree of organization, may suppurate, and give rise to abscesses, as in natural structures. Frequent examples of this are presented by the pleura and peritoneum. But not to dwell longer on this point, let us go on, in the next place, to consider some of the local and general effects of suppuration.

When suppuration is about to take plae, heat and throbbing will be felt in the part; and if the finger be pressed upon it, a distinct pitting will be produced. As yet infiltration only has taken place. As soon, however, as the pus corpuscles begin to accumulate, fluctuation will be present, and this will become the more distinct as the abscess increases or approaches the surface. Now, as is the case with almost every local derangement, in inflammation, too, there is almost always more or less general derangement, through sympathetic action; and here, *symptomatic fever*, as already described, may present itself. It may be frequently a matter of great importance to distinguish the *exact period* at which suppuration has taken place. Previous to the coming on of suppuration, we find that the fever has presented no cold stage; there has been no chill—no decided rigor. As soon, however, as pus is formed, we have more or less chill; sometimes a mere creeping sensation; sometimes a decided rigor, followed by hot skin, full pulse, flushed cheek, and all the symptoms of a high inflammatory fever. This fever, when once formed, tends greatly to take on the periodical type. Each paroxism goes off with profuse sweating; while the other secretions also are increased, and the urine is found to throw down a very large proportion of those salts naturally contained in it. Sometimes, however, the fever takes a different type; the blood is reduced in plasticity; the periodical symptoms return; fever generally comes on at night and in the morning; the face is pale, with a slight flush upon the cheek, the body emaciated, and the secretions profuse; and great sweating and copious diarrhœa come on—the patient thus presenting the condition termed "hectic."

But let us return to Abscess. This we have already described as a circumscribed cavity containing pus, which, after a little time, becomes lined by the pyogenic membrane.

For convenience, abscess is divided into several varieties. First we have *acute* and *chronic* abscesses, which we need not stop to define. Secondly—as suppuration depends on a variety of causes—we divide them into *common* and *specific* abscesses; and again, as the result takes place at the point of attack, or at some remote locality, we have abscesses divided into *primary* and *metastatic*. It is a little remarkable to observe, that an abscess will sometimes suddenly appear in a spot where twenty-four hours before, there was no sign of inflammatory action. The explanation of this is difficult. In the *purulent diathesis*, we have frequent examples of it; where the parts presenting all their natural appearance, an abscess suddenly is developed. The abscess may appear at some point quite remote from a suppurating surface; for example: after a surgical operation the patient will suddenly complain of dyspnœa; all the pathognomic symptoms of pneumonic congestion present themselves; and after death, abscesses in the lungs are found to have existed. It was formerly thought that this pus arrived in the lungs by transportation. This, however, was an error; for, as already stated, pus can never be absorbed *as pus*. These abscesses are more properly to be attributed to phlebitis, the inflammation extending through the veins by continuity of surface. Again, after operations about the anus, symptoms of gastro-hepatic inflammation frequently present themselves, which, if not controlled, will soon be followed by abscess in the liver, caused in precisely the same manner, some small vein in the neighborhood of the anus taking on inflammation and communicating it to the portal vessels. We need not, however, dwell longer here. Let us, in the next place, go on to consider what our duty is when suppuration has already taken place. In the treatment of many injuries, we do all in our power to promote suppuration; and, on the other hand, we often desire to prevent it.

When we desire to prevent it, general antiphlogistic measures must be pursued. But if we find that in spite of all our efforts, it will take place, then we must change our tactics, and endeavor to promote it. How then is suppuration to be promoted? If the inflammation is so high as to give great pain, or to endanger the life of the part, we must again resort to depletion; but if these urgent symptoms do not exist, we must, by the use of warm fomentations, strive to facilitate the suppurative process. Where ordinary suppuration takes place, in a strong, healthy individual, we must not entirely abandon our antiphlogistic treatment; though we should take care not to carry this treatment too far. Sometimes it may even become necessary to sustain the patient by the use of tonics, strong diet, &c. When suppuration is about to take place, if the constitutional irritation is so great as to keep the patient constantly worried, and to prevent sleep, it will be advisable to procure rest by an anodyne, united with some diaphoretic. When the abscess is formed, the first indication is to evacuate it, and relieve the part from the irritating presence of the pus. The means for opening an abscess may be said to be threefold,—that by the knife—that by caustic—and that by seton. Each, in particular cases, may be selected, but the first is generally to be preferred.

The first—by the knife—being determined on, several considerations should be regarded; as the time for making the orifice, the manner of doing so, and its position.

Now as to the time: where the abscess is superficial, and there is no objection to a scar being formed, we shall save the patient much pain by using poultices, &c., until the pus has reached the surface, and then opening and evacuating the abscess.

But where the progress of the pus towards the surface is opposed, and it is thus retained among deep-seated parts, as below layers of fascia, we cannot wait; for, by so doing we may expose the patient to the loss of his life, or at least of his limb; as, by burrowing deeply among the tissues, pus may materially injure the bone, and other textures.

In these cases, therefore, as soon as fluctuation is perceived, a long bladed, sharp pointed bistoury should be thrust directly into the abscess; the orifice should be kept open; and pressure by the uniting bandage should be resorted to.

Again: where abscess is situated near some important cavity, or where it is upon the face, *particularly in females*, it may be advisable to open early. Otherwise, it is best to wait.

Again: the *direction* of puncture requires some attention. It is scarcely necessary to remark, that the vessels should always be avoided. Where the abscess is on a limb, it should be punctured in the direction of the axis of the limb; and if on the face, the orifice should be in the lines of the folds of the skin, so as to avoid as much as possible, the formation of a scar. Again, in the evacuation of an abscess, there is a difference as to the size of the opening; but, in this respect, your own judgment must be your guide. Sometimes it may be necessary, in very large abscesses, to make a small opening, and evacuate slowly. This is particularly the case in "psoas," or "lumbar" abscess—a kind of abscess of which I have not yet spoken, and concerning which I do not design, at present, to make any remarks. If the abscess is small, we should, as a general rule, open freely.

There is another point connected with the opening of abscess, of some importance. When we have opened freely, we may by gentle pressure, assist in the evacuation; but never, by rude manipulations upon a tender surface, attempt, as the old women term it, "to squeeze out the core." After the evacuation of an abscess, the only dressing necessary is mild emollient poulticing, with, sometimes, the application of warm or cold water. Where there is much pain it may be well to add some mild anodyne, hops, poppy-heads, or something of that kind, to the poultice.

The method of opening by the use of caustic and setons is seldom resorted to, except in chronic abscess. All that is necessary in opening by seton, is to have a seton needle, armed with a seton. Grasping the integuments in the hand, the needle is to be plunged directly through them, and the seton is to be left in its position. In opening with caustic, potassa fusa is the article generally employed. A bit of adhesive strap is to be applied over the part; a small round orifice, exactly the size of that desired to be made, is to be cut out of the strap; and the caustic is to be rubbed freely over the surface thus exposed; which is then to be protected by another strap passed over it. This expedient, however, is seldom resorted to, except where circumstances compel it; as, for example, where we have to do with a patient so timid as to greatly fear the use of the knife. The constitutional symptoms of abscess require some further consideration; but these will be the subject of the next lecture.

LECTURE VI.

ABSCESS CONTINUED—CHRONIC ABSCESS—PSOAS ABSCESS, &C—HOW DISTINGUISHED FROM HERNIA—PROCESS BY WHICH ABSCESSES HEAL—DIET AND GENERAL TREATMENT.

We have stated that abscesses might be divided into *acute* and *chronic*; or, as they have been termed "*hot*" and "*cold*" abscesses. I wish you to understand that my remarks yesterday were intended to apply to *acute inflammatory abscess*, as existing in a *healthy* condition. Our treatment must be varied, to suit the nature of the case. When the constitution is feeble, and deficient in plastic forces, the process of healing is slow, and the pus is frequently different from that of healthy acute abscess. It is under such circumstances that we have *chronic* abscess; the treatment of which will now come under our consideration. Here, as previously, poultices may be resorted to; and it will frequently be found useful to add to them some stimulating substance. Some aromatic herb, gum or resin, or some such substance may be used, and will be found to hasten the phenomena. It will sometimes be found necessary to use other more stimulating applications with the same view. A combination of the ointment of iodine and that of mercury, in the proportion of about an ounce of the former to a drachm of the latter, will be frequently useful, as will also a blister. When, however, fluctuation is once perceived, it becomes necessary to get rid of the pus by one of the three methods already mentioned; by seton, caustic, or the knife.

When you have a small abscess near the surface, instead of opening it by a puncture, as in acute abscess, you must lay open the whole extent of the cavity, and expose the inner surface to the atmosphere; and in addition, it will be useful to introduce a tent of dry lint. By these measures we change the action of the part, and promote the exudation of coagulable lymph. With this same view, Baron Larey proposed that they should be opened with a white hot trocar; or, for the same purpose, we may open it with a seton, leaving it in, and allowing the matter to escape beneath it. If the abscess has existed long enough for a pyogenic membrane to have formed and become thickened, and the pus, by being confined by fascia, has burrowed and formed fistulous canals, it will generally be necessary to lay open the whole internal surface, and, by the aid of a grooved director, to slit up the canals. Now, while these may be recognized as the general rules for the treatment of ordinary chronic abscess, we find that there are cases which demand other particular modifications of treatment. Examples of this will be seen in abscesses resulting from caries of bone; and as an important instance of this, we may mention psoas abscesses, from caries of the lumbar vertebræ, where the pus descends behind the peritoneum, and presents itself in the groin, in the loins, or around the anus. Such a case may be mistaken for hernia; and hence it is a matter of the highest importance that we should make a correct diagnosis. In relation to this I may here remark, that where the abscess presents under Poupart's ligament, it will present a soft fluctuating tumor—sometimes returning into the abdomen upon the patient's assuming the recumbent posture; and that it differs from crural hernia, in passing on the *external* side of the femoral vessels, whereas hernia passes on the internal. These considerations, then, will serve to distinguish psoas abscess, whether of carious origin or otherwise, from hernia. If, upon examining the contents of a psoas abscess, we discover, with or without the aid of the microscope, any scale-like particles, we are convinced that the cause is caries of the bone. If none of these are found, our prognosis will be more favorable. The previous symptoms may also assist us in forming our diagnosis.

In cases of psoas abscess, the collection will generally be found to be large; and our treatment in such cases should be conducted with great care. We should evacuate the abscess gradually, and prevent the entrance of air; as the sudden and extensive inflammation which would result from this cause, would produce constitutional effects of a highly dangerous tendency. In all these cases, then, you should proceed very cautiously. Placing the palm of the left hand on the abscess, and drawing the skin to one side, you should make a small oblique puncture into the sac of the abscess. Keeping the hand in this position, draw off as much as may be thought safe, and closing the wound, suffer the patient to remain in this state for two or three days; at the expiration of which time, you may again open in the same manner; and you must continue to repeat the operation until the sac is entirely emptied of its contents. Again, it sometimes happens that chronic abscesses are found to contain matter of a *curdy* consistence and appearance. In these instances, we should open freely. In some examples of this kind, especially where they take place in the texture of a gland, the abscess is found very hard to heal. When this is the case, a tent of lint may be introduced, or caustic may be used, until a sufficient degree of adhesive inflammation is excited to close the sac. This treatment will be much aided by compression, which will be found useful in assisting to obliterate the cavity. These, then, may be considered as the general rules to be laid down for the treatment of chronic abscess.

It may be well here to say a few words concerning the process by which abscesses heal. After the abscess is evacuated, its fibrinous membrane contracts, and sometimes at once closes the cavity; this being effected partly by the inherent elasticity of the membrane itself, and partly by the contractility of the surrounding parts. When the abscess is large, however, this contraction alone will not obliterate it. A vital act then commences. The formation of pus diminishes; and plasma exudes in a liquid state, then congeals, and forms a hyaline homogeneous mass; nucleated cells appear, and take upon themselves a regular order; vessels from the neighboring parts are prolonged into them; and we have springing up a layer of ***granulations***, such as appear on all large healing surfaces. This process is repeated; and layer after layer is thus formed, and the cavity is gradually filled up. The skin, in the meanwhile, contracts around the orifice; epithelial cells are thrown out; and the opening is thus closed by cicatrization. I have already said, that where suppuration is of some extent, constitutional effects are apt to supervene. When there is much pain, it must be relieved by anodynes; and when there is much debility, generous diet should be allowed, and even tonics and stimulants may be used. Night sweats must be checked by Dover's powder at bed time, by quinine and mineral tonics during the day, combined with a generous diet, and by the use of porter, or ale, while sponging with a solution of alum, will also be found a useful remedy. When diarrhœa comes on, it must be checked by opiates and astringents, particularly at night, in order to secure rest.

LECTURE VII.

LYMPHATIC TUMORS AND LYMPHATIC ABSCESSES—THEIR CAUSES—SYMPTOMS—RESULTS AND TREATMENT.

There is another variety of abscess very nearly allied to the chronic, with which, indeed, it has been generally confounded, notwithstanding there are very palpable differences between the two conditions. I mean the *lymphatic abscess*, so called, from the lymph-like character of its contents. Under this head we must notice two allied affections:—the lymphatic tumor (tumor lymphaticus) and the lymphatic abscess (abscessus lymphaticus) properly so called. The first is a soft, indolent tumor, variable as to size, with but little alteration of the sensations of the part, and without notable discoloration of the skin, deriving its origin from rupture or erosion of one or more of the lymphatic vessels, and extravasation of the lymph into the cellular tissue, either beneath the skin or the fascia. The second is a true indolent abscess, sometimes small, frequently acquiring a large size, irregularly circumscribed, apparently formed without any very palpable evidences of pre-existing inflammation, and, in the earlier period of its development, merely characterized by an unpleasant feeling of pricking and tension, which sensations are increased by motion. The contents of these abscesses are variable—sometimes a glassy, almost transparent fluid, sometimes turbid, or mixed with flakes, and occasionally with small, darkish, or whitish colored particles, which form a kind of sediment.

In both cases the development of the disease is very gradual, for sometimes it is almost imperceptible, and cases not unfrequently occur in which an affection of this kind is several months, or even a year, in running through all its stages. As the volume increases, the surrounding parts, in the vicinity of the fluid collection, become more and more indurated; and beyond that limit the cellular tissue, after a time, becomes infiltrated and œdematous, as does the tumor itself; but the skin still retains its natural color and temperature. This induration forms a barrier limiting the fluid contents of the tumor, and as the disease progresses, the whole cavity becomes lined by a somewhat dense, uneven membrane possessing but little vascularity, which then becomes a kind of secreting surface. As yet there is not much fluctuation, especially if the collection be deep seated, and there is but little local or constitutional disturbance. Sooner or later the swelling increases: the tumor becomes more prominent and expanded; pain, uneasiness, or stiffness are now conspicuous; the skin becomes more tense, assumes a red color, and becomes more sensative; the surrounding œdema is more diffused; the sac, as well as the adjacent parts, take on an obscure grade of inflammation; and the contents of the abscess, which previously were almost transparent or lymph-like, assume more or less a purulent, sanious, or curdy appearance, and sometimes become offensive. The superimposed structures are gradually absorbed; the matter progresses towards the surface; the skin becomes more and more attenuated; and the abscess finally opens, and discharges its contents. In some instances this event does not take place, until the tumor has attained the size of the fist, or even of the head of a child.

Coincident with these changes, the constitutional symptoms undergo a corresponding increase. The countenance becomes pale, sallow, and haggard, the appetite depraved and capricious, the digestion enfeebled, the secretions perverted, and the whole functions of nutrition seriously impaired. And, finally, as the disease advances, febrile exacerbations occur towards evening, followed by wasting sweats; emaciation and general prostration rapidly supervene; and the sufferings of the patient are often terminated by confirmed hectic and colliquative diarrhœa.

Lymphatic tumors and abscesses may form upon any part of the body, but their most frequent seat is upon the back, between the shoulders, in the neighborhood of the axilla, about the neck, or upon the thigh or leg. They are most generally single, but sometimes multiplex; and in the latter case several may form at once, or consecutively.

The causes of these affections are of course variable. The proximate cause of lymphatic tumors we have stated to be a rupture, or opening of one or more lymphatic vessels, and the consequent extravasation of lymph into the cellular tissue. This may arise from violence, or from changes accruing spontaneously, or over distention of the vessels from obstruction, or a diseased state of their tunics, or softening, ulceration, &c. Lymphatic abscesses always occur in a depraved state of the constitution, in which the plastic powers are depressed under the influence of a general cachectic dyscrasy.

The subjects of the disease are almost always feeble, pale, sallow, and incapable of much exertion; and in many of them there exists palpable evidence of a general state of *venosity*, or *venous plethora*, which by impeding the easy ingress of the lymph and chyle into the venous circulation, throws it back upon the minute radicles of these vessels, and thereby gives rise to undue distension and other derangements, which finally lead to the development of these tumors and abscesses.

The affections in question must not be confounded with bursal tumors, chronic abscesses, or those which depend upon metastasis. An attention to position, the mode of formation, contents, &c., will render it easy to avoid such a mistake. The prognosis, although not necessarily unfavorable in all cases, is decidedly so in many, especially where the abscess is large and the constitution seriously deteriorated.

Lymphatic tumors and lymphatic abscesses, although differing essentially in their mode of origin, have nearly the same termination, and therefore require the same mode of treatment. The indications are—first, to disperse the tumor where this is possible; secondly, to change its condition, so as to impress upon it the character of a common purulent abscess, and to evacuate its contents; thirdly, to arrest the discharge and promote the healing process; and fourthly, to rectify the faults of the constitution.

In slight cases, the first indication may be fulfilled by stimulating applications—as exciting lotions and plasters, painting with tincture of iodine, iodine ointment with mercury and camphor, pressure by a graduated compress and bandage, adhesive strips, &c. Blisters will also be very valuable. Where these means fail, more potent measures will be demanded. Here an issue may be established over the tumor, or in its vicinity, by the use of the potassa fusa; or what is better, when the abscess is large, an eschar may be established by means of a heated button-shaped cautery; or a blunt-edged cautery may be drawn across the tumor at several points, leaving a space of three or four lines between the points of application. These remedies are very efficient in promoting absorption; and if they fail in this, by invigorating the sac of the abscess, they promote the purulent secretion. Besides, when puncture becomes necessary, the puncture may be made through the deepest part of the eschar thus already formed.

Some of the measures just suggested will be effective in fulfiling the first element of the second indication, viz: the change of the character of the tumor or abscess. The second indication will demand either puncture, caustic, or the seton. You will select the one or the other of these, according to the character of the case. Where the tumor is small and recent, you may lay it open with the bistoury, afterwards filling the cavity with lint. The same course may be pursued, even in large lymphatic abscesses; but in most cases of this kind, it will be better to puncture with a trocar, and after drawing off the contents, to inject tincture of iodine, and suffer it to remain in situ. Some have recommended injections with scalding water; others with a diluted solution of the acid nitrate of mercury. When the latter is used it will be better to lay open the tumor and apply the medicament to the cavity by means of lint. We have already spoken of the cautery, both potential and actual, as a means of promoting a change in the character of the abscess. It may be carried to the extent of opening the tumor, or the latter may be afterwards punctured. In many cases of this kind, however, the seton fulfils the two-fold indication of changing the character of the abscess, and evacuating its contents. It may be often resorted to with advantage.

After the tumor or abscess has been evacuated, it often becomes necessary to resort to some means of arresting the discharge and obliterating the cavity. In cases of lymphatic tumor, where a vessel has been ruptured and continues to pour out lymph, it may be necessary, in order to arrest the latter, to apply either caustic or the actual cautery to the orifice of the open vessels; and the same, as well as other excitants, applied to the lining of the cavity, may be necessary to excite granulation and the healing process. The last indication, relating to the defects of the constitution, will require a variety of means, according to the co-existent defects. Mild alteratives and aperients; anodynes, to allay pain; tonics, such as iron, quinine, &c., with ale, porter, wine, &c., will be the means upon which most reliance can be placed; to which must be added change of air, exercise, &c.

LECTURE VIII.

ULCERATION AND GANGRENE—ANALOGY BETWEEN THEM—DEFINITION OF ULCERATION—VARIETIES—TREATMENT OF SIMPLE ULCERS.

On a previous occasion we have had to mention, as among the effects of inflammation, a greater or less solution of continuity, or destruction of parts. The process by which this is effected has been divided into two kinds; i. e.—*Ulceration*, and *Grangrene* or *mortification*. Were an example of each to be presented to your eyes you would not regard them as at all similar; yet, in their essential character, there is a striking analogy between them. The process in each case is that of *death;* in the one it is the death of *particles*, in the other that of *masses*.

Ulceration may be defined—"a solution of continuity occurring spontaneously, on the outer or inner surface of the body." In general, after the solution of continuity has taken place, a secretion of pus appears; and ultimately the surface becomes covered with granulations. How is it then that a portion of the body is removed? In the determination of this question we must take a step backwards. We have said, that in an inflamed part there was a flow of blood, a dilutation of vessels, a stasis, and an exudation. Now, when, in consequence of inflammation, the vessels become obstructed, and the vital action of the parts is thus put an end to, the death of more or less of that part is the result; and we have, either ulceration, or mortification. As soon as particles die, they become foreign matter and must be carried off. In ulceration this is done singly, by absorption, or by the secretions of the ulcer; and this goes on as far as the destruction of vitality in the part has taken place. The two processes (sloughing and ulceration) may sometimes be combined, forming what is called a sloughing ulcer. When we consider the diversity of influences bearing upon this process, we shall not be at a loss to account for the great variety in the *causes* of ulceration. Any thing that may obstruct the flow of blood, either arterial or venous, may give rise to it. If this obstruction is sufficiently complete, mortification will be the result. Any long continued pressure will have the same effect; and, as an example of this, we may mention bed-sores. The essential requisite, then, for ulceration is, *molecular death.*

We must now consider how it is that nature, either alone, or assisted by art, can restore the part thus destroyed. Plastic material exudes (fibrin being the most important constituent,) from the neighboring vessels still active. This, when poured out, is in a fluid state. After a time nucleated cells begin to appear throughout it, and to group themselves together at the bottom of the ulcer, where they are soon converted into a vascular structure, the new vessels being prolongations of the old ones; and by a succession of these granulations the cavity is filled up. By a process precisely similar, the skin is also reproduced, which in addition, exhibits a kind of contraction, by which the contour of the ulcer is lessened. Epithelium and pigment cells are also produced, and thus, by laws beautiful to behold, a large part may, by successive steps, be reproduced. When we consider how very delicate a process this is, we should always be careful as to the extent to which we may interfere with the operations of nature in such cases.

Ulcers differ considerably in the causes producing them, and have hence been divided into several varieties. First, we have *common,* and *specific ulcers;* the first depending upon common or general causes; the latter on special or particular causes. Again, we have *acute,* and *chronic* ulcers; the one comparatively quick in going through its various stages, the other more tardy. Again, we have *indolent,* and *healthy* ulcers; *simple* and *malignant* ulcers, &c.; and even many other varieties have been spoken of, as the *sloughing* ulcer, the *phagedenic* ulcer, &c. In fact their number is too great for me to mention them all here.

We will now consider the treatment of simple ulcers, in a healthy constitution; though here we have very little to do. The limb must be placed in a position favorable to the return of the blood; the surrounding temperature must be moderated; any clothing which may injuriously press upon the part must be removed; the system must be regulated; and the mildest and simplest dressings must be preferred. Water dressings—through the medium of any kind of spongy paper, or of soft lint—are to be most relied on. "Healing salves" (so called) are abominations. They often retain the discharges, and irritate the part. If the granulations are preternaturally large, and you find them inclined to bleed easily, it will be necessary to use some stimulating application. This should at first be weak. Its strength may be increased afterwards, if it is necessary to do so. Applications of this kind should be varied frequently, as habit appears often to prevent the effect of any one of them from being constant. If the ulcer be of a different character from those we call simple, we shall be obliged to change our treatment; and it will be our endeavor in the next lecture, to consider the means necessary to be used in the various modifications of the ulcerative process.

LECTURE IX.

ULCERATION CONTINUED—VARIOUS MODIFICATIONS OF THE ULCERATIVE PROCESS—TREATMENT.

In our remarks at our last meeting, we stated that we had reference only to simple ulcer in a healthy constitution. We find, however, when we regard this process in its variety of aspects, that there are a multiplicity of circumstances which frequently stand in the way of its healthy continuance. It is our design in the present lecture briefly to point out some of the obstacles to be overcome. You will very frequently meet with ulcers in which healing is prevented by the intensity of the inflammatory action. Here you will find the parts surrounding the ulcer to be red and inflamed, and there will be great heat and throbbing. Now, as long as the sore remains in this condition, it cannot be healed, and it either remains stationary or the destructive process continues. Your duties will here have reference, in the first place, to the abatement of the inflammation by anti-phlogistic measures. Sometimes we may derive benefit from local or general blood-letting. Purgatives are nearly always used with much advantage. We should regulate the secretions of the skin and the alimentary canal; and, in short, we should adopt the same treatment as that laid down for inflammation, as all of those remedies will, with certain modifications, be applicable here. Having, by these means, converted the sore into a healthy ulcer, we have only to leave it to the powers of nature, the surgeon's duty being only to facilitate her operations by those means already spoken of in the treatment of simple ulcers. Again, you will sometimes find ulcers in persons in whom the healing is interfered with by a *neuropathic condition* of the constitution. There may be no inordinate redness, yet the pain is intense, and the constitutional symptons run high. The appetite is depraved, the digestion bad, and the whole system so deranged as to prevent a cure until it is restored to a healthy state. These are termed "*irritable*" ulcers and the greater portion of your attention, in *their* treatment, is to be directed to the relief of the *constitutional* derangements. Small doses of alterative medicines should be administered from time to time, with anodynes at night; and to obviate their effects upon the bowels, these should be followed by gentle aperients in the morning. Little else will be required, except an invigorating diet, and sometimes tonics, vegetable or mineral. I would here remark, that I consider it *absolutely necessary*, that in this species of ulcer the narcotics should be used at night, *in large doses*. This course you will find to secure rest, to give a genial warmth to the skin, and to restore the proper action to the capillaries. The local treatment should be of a mild character. Water dressings, containing a little opium, may be used. They are to be applied by means of pledgets of lint, wet and applied to the part. Other anodyne substances may also be used, as an infusion of poppy-heads, or of hops. By these means we may reduce, an *irritable* to a *simple* ulcer.

Again: an ulcer may be prevented from healing by a state of indolence. In this instance there is a diminution of the *plastic force* in the vessels of the part in which the ulcer takes place. Now, it may happen that an ulcer is *indolent* from its very inception; but it more frequently happens that it acquires this character after it has been of long duration, either from neglect or bad management. This variety of ulcer is more frequent among the laboring classes; and in such cases it is very difficult of cure. The ulcer is of a pale color; the granulations are few; and there are none of those florid, compact granulations, which are to be seen in a healthy ulcer. There is an inadequate supply of blood, a want of sensibility, and frequently a lowering of temperature; the edges are hard, elevated, and frequently almost fibro-cartilaginous; the surrounding tissues assume a compact, fibrous nature: and there are always a number of vessels obliterated, and converted into dense fibrous structures. It is in vain to attempt to heal this kind of ulcer, before correcting this condition. So variable are these indolent ulcers, that no one plan of treatment can be regarded as always successful. Where there is a slight degree of indolence, and where the parts are not yet much changed from the condition of a simple ulcer, stimulating applications may be used, changing them from time to time, and attention being at the same time paid to the state of the constitution. Stimulants, such as the metallic salts, &c., may be used in solution, the strength being made sufficient to produce a slight smarting. Dry metallic salts and oxides may also be used, being sprinkled upon the surface from time to time. Vegetable powders may be resorted to; as for example, bark and rhubarb powders; and in slight indurations you will often give great benefit by the appplication of mechanical support. If situated on the limb, the best method is by using a roller bandage applied from the lower to the upper end. Where the border is callous and the base hard, it is advisable to paint the sore with tincture of iodine, to apply nitrate of silver, or to make use of some of the mineral acids. But you will not unfrequently find ulcers in which all of these means will fail. Here more energetic measures become necessary. Where, in such cases, the edge is hard and indurated, you may take a scalpel; and, running it around the contour of the ulcer, and taking care to cut far enough to ensure the scalpel's passing through more vascular parts, you may remove the whole indurated mass, at the same time freely scarifying the base. This plan will often succeed at once. If necessary, it may be repeated. Sometimes I have removed the whole ulcer as though it were a tumor. Some ulcers of the leg cannot otherwise be cured.

Where the knife is objected to, the whole surface may be destroyed by some of the stronger caustics, potassa fusa, the mineral acids, &c., or even the actual cautery. These are severe remedies, but, under certain circumstances, their use is fully justified. As regards the use of the actual cautery, I may here make use of the remark of an old quack, who, promising to cure an ulcer for fifty dollars, applied the actual cautery, and being about to depart, was remonstrated with by the patient, and reminded that he had promised to heal the ulcer. Whereupon he replied, "that he had cured the ulcer, and that *any fool knew how to heal a burn*." Mechanical support, as already stated, may also be of considerable advantage. The best method of applying it is as follows: Take, for example, an ulcer on the leg. After having thoroughly cleansed the ulcer, apply strips of adhesive plaster, about an inch in width and long enough to pass around about two-thirds of the limb, in such a manner as to envelope the ulcer and the adjacent parts of the limb, taking care to leave at the seat of ulceration, a space between the straps sufficient to allow of the escape of the discharges; then, applying a pledget of soft lint over the ulcer, cover the whole with a roller bandage. This dressing may remain for several days without being removed; and after having been removed for the purpose of cleaning, it may be again applied in the same manner. I have sometimes derived great advantage from the use of a piece of smooth sheet lead, cut of the proper size, and applied directly to the surface of the ulcer, a roller bandage being then passed over this. The lead, by its pressure, promotes absorption and keeps up a support, and by its smoothness and polish prevents irritation. But while you are thus attending to the local treatment, the constitution must not be overlooked. We must particularly attend to the digestive apparatus; and it would be as well here to remark, that among the class in whom you will most frequently find this kind of ulcer, about seven out of ten will be laboring under some derangement of this function. If you allow this state of affairs to be kept up, it will be in vain to attempt to heal the ulcer. Here a blue pill will, from time to time, be found to be indicated; and I would now repeat a remark already made, that the peculiar invigorating effect of a large dose of opium will be found of the utmost advantage. It is best given in combination with mercury in small doses. Where the constitution is weak, it may be advisable to support the strength by invigorating, or even by stimulating diet, by tonics, alcoholic drinks, &c.

Again, we often find, that instead of the granulations being small and feeble, we are presented with an ulcer in which they are exuberant, spongy, flabby and easy to bleed. These are called spongy or fungous ulcers. It is this kind of ulcer which is so much dreaded by old women; and not a little of your reputation with them will depend upon your skill in destroying this "proud flesh," as they call it. Your object should be to give tone to the part, and to reduce the granulations to a healthy standard, by stimulants, pressure and support; attending at the same time to the constitution.

You will again meet a modification of ulcer, in which, from time to time, a part or all of the granulations will die and be cast off, as in mortification, presenting us with what is called a sloughing ulcer. Here too, the object will be to give tone and increased vitality to the part, and to bring it up to the point at which plasma will be effused and organic cells formed. Here strong applications will be necessary. Pyroligneous acid is particularly useful; and the various antiseptics will also be of benefit, as charcoal poultice, chloride of lime, chloride of soda, &c. Very nearly the same remarks will apply to *phagedenic ulcers.* The constitution is frequently affected, and must be supported. The local applications must be stimulating, and it is often necessary to vary them.

I will now call your attention to a kind of ulcer frequently found among delicate females suffering from a disorder of the catamenia. These ulcers may appear on any part of the body; generally, however, they are found on the lower limbs, presenting a rounded, excavated appearance. Now, just at the period when menstruation is about to take place, and before the flow comes on, the ulcer becomes infinitely more angry in its appearance, and during the whole flow it may exude blood. This blood appears to be nothing more than a vicarious menstrual discharge. Now as long as the cause remains, such ulcers cannot be healed; or if healed, they may produce some constitutional derangement. It is highly important in their treatment to use proper emmenagogues, and to regulate the bowels, persevering in this course until the cause of the disease is removed. Again, in hemorrhoidal patients, and those suffering from hepatic derangements, ulcers of the leg, will not heal until you overcome the abdominal venous congestion. This will be best effected by a proper regulation of the diet, by the use of alteratives, &c.

As you will remember, I have already remarked, that besides these general ulcers depending on common causes, there was a large class produced by some peculiar virus; but as the consideration of these would lead us into discussions upon the peculiar character of each, and of topics, many of which do not belong to my chair, they cannot properly be classed under our present head.

LECTURE X.

MORTIFICATION—ITS DEFINITION—VARIETIES—CAUSES—SYMPTOMS.

We have already mentioned *mortification* as one of the results of inflammation. Now, what is mortification? We define it to be *that condition in which there is the death of a part of greater or less extent.*

We have said that ulceration was death by *particles*, or *molecular death*, but that mortification was the death of some *part of greater or less extent*, being sometimes confined to particular spots, and sometimes involving an entire member. Now, when we turn our attention to the *literature* of mortification, we find that authors have been at great pains to divide and subdivide the affection into many varieties. Using mortification as a *generic* term, they very early divided it into two species; *gangrene* and *sphacelus.*

When we come to consider what constitutes the difference between these, we find, upon careful examination, that it exists only in appearance. The term gangrene is meant to apply to that stage in which the part yet retains some vitality, there being still some vessels which keep up the circulation. In sphacelus, on the contrary, vitality is entirely extinct; the part is cold; there is no circulation; and soon, from changes *entirely chemical*, it becomes of a dark brown or black color, and is infiltrated with an offensive fluid, which contaminates the surrounding parts, and poisons the air with its unpleasant effluvia. The difference, therefore, between these does not really exist, and the division can apply only to these different stages of the same process.

We must, however, consider mortification under a different aspect; and here we find it convenient to divide it into several varieties. First, with reference to its causes, we have two leading varieties, *idiopathic* and *traumatic* gangrene; the first occurring spontaneously, or springing from causes already existing in the economy; the second resulting from the influence of violence of some kind, inflicted upon the living structures; a difference of the utmost importance to be kept in view, as the treatment will vary accordingly.

Again, we may divide mortification, having reference to the condition of the part, into *humid* and *dry* mortification or gangrene.

In the first, the part is moist and infiltrated with a kind of sanious fluid; and under this head we are presented with the greatest number of cases. The second is characterized by the entire absence of all fluid; the part is dry, and sometimes black, rough and shrivelled.

The causes of mortification are infinite in number, and vary exceedingly in their natures. At present, our object is to study it as a consequence of inflammation; though this is far from being its only cause. Any condition of the arteries, by which they may be prevented from keeping up a proper supply of blood to the part, may produce mortification; as, for example, a ligature where the collateral circulation is not sufficient to support life in the part, a bandage too tightly drawn around a limb, or any change in the vessels themselves, or in the blood, precluding a proper supply. Each of these causes may produce mortification. In that condition in which we are likely to find the arteries of old persons, inaptly known as ossification, the scales of calcareous matter may obstruct the vessels to such a degree as to bring about mortification. Again, it sometimes happens that coagula form in the vessels, and these may produce the same result; or, on the other hand, from weakness of their coats, vessels may become so greatly *dilated*, as to impair the circulation to a sufficient degree to bring on gangrene of the parts they supply. Mortification is also sometimes produced by *pressure*, even on the capillary vessels only; and as an example of this, we have the occurrence of bed-sores. We must not, however, limit our attention to the capillaries and arteries alone, for we sometimes find particular conditions of the *veins* giving rise to the same results. Thus, when a vein of considerable size is obstructed, and thus interferes with the circulation through the capillaries of the parts from whence its branches proceed, certain changes are there produced, which result in the death of those parts.

When we study attentively the relations existing between the *nerves* and the blood vessels, we find that they harmonize, not only in their distribution, but also, to a certain extent, in their vital actions; the integrity of the circulation depending greatly on the integrity of the nervous actions, and *vice versa*. In the consideration of mortification, then, we must also turn our attention to the impairments of *innervation*; whence this also must be regarded as one of its causes. Thus, for example, in a paralyzed limb, we sometimes find that mortification comes on, depending evidently upon a weakness of the vessels which is caused by a want of proper innervation, and the consequent derangement of the circulation. Besides these causes of mortification, we also find a variety of *substances* which act in a deleterious manner upon our living structures. Whenever, for example, an animal has been fed for some time on the secale cornutum, or ergot of rye, mortification of the extremities is apt to result. The same effect is also produced by this article upon the human family. Thus, when in certain neighborhoods, and at certain periods, persons have fed upon grain mixed with this article, a peculiar convulsive effect has been produced, with gangreneous sores and mortification of the extremities,—a state of the system known as *ergotism*, and resulting frequently in death.

During the prevalence of plagues and epidemics, we find, that from slight causes, parts are found to be attacked by death, the system appearing to have been so much weakened and depressed by the morbific agent, as to be unable to bear up, even against slight injuries. This is found to be particularly the case in the oriental plague, and I have even seen such cases in our epidemics of *Yellow Fever*. Where such a tendency is perceived, it might be dangerous to use any means by which the integrity of a part may be injured. There are various substances, which, when introduced into the structure of our organs, produce the same effect, as the stings of insects, the bites of reptiles, &c. There are also agents whose action is chemical, and the effects of these may be either direct or indirect. Cold also—though in its primary action it gives tone to the system, may ultimately produce mortification. You will perceive, that it is necessary to distinguish between these various cases, as the treatment will vary accordingly.

Next let us proceed to investigate the *symptoms* of mortification. These are two-fold; first, as manifested *locally;* and secondly, as manifested *constitutionally*. For example, let us suppose a case of mortification resulting from inflammation. For convenience we divide the process into several different stages, each presenting its peculiar characteristics. In the first stage we include those changes which precede actual death; in the second, those chemical changes which accompany death; in the third, that process by which death is arrested; in the fourth, that process by which the dead parts are thrown off; and in the fifth, that action by which the lost part is restored. It is necessary that this division be borne constantly in mind, as the treatment varies with each successive stage. Here, then, let us consider the symptoms which accompany the ***first stage***, or that in which we include those changes which precede actual death. The redness of the part grows deeper and gradually more or less brown, then of a livid, and finally of a black color; the pain is increased, and is sometimes of an intense burning character, which no language can describe; and at this juncture, the infiltration is much increased in quantity, and assumes a darker hue, from a combination with broken down blood corpuscles, which have escaped from some of the small vessels. On making pressure, we find the part more œdematous and inclined to pit: a sanious, ichorous exudation takes place between the dermis and epidemis: and as the process goes on, the texture of the skin is impaired; it breaks easier, peals off, becomes black and wrinkled, and is distended by a large amount of sulphurated hydrogen gas, as shown by its tarnishing a silver probe. In the second stage, or that of death, the changes which go on are all chemical, and are so well known as to render a description useless. In the third, or that in which the process of death is arrested, important changes take place. These should be carefully studied. The intersticial arrangement of the surrounding parts becomes filled with coagulable lymph, developing organized cells, and the whole vital action is here so exalted, as to prevent the further extension of the disease. Let us now see in what state the principal vessels are found. A greater or less number of them are plugged up. Suppose, for example, a case of mortification of the leg; here the anterior and posterior tibial arteries may be so entirely closed by the coagulated fibrin of the blood, as to render a ligature, after the operation for removing the limb, frequently unnecessary, the other main vessels being also in this condition. An instance of this kind came to my notice some years ago. I did not have to use a single ligature, although I amputated both legs one or two inches above the affected part. We come now to consider the fourth stage, or that in which the dead part is thrown off—a process commonly known as sloughing. Nothing serves to show more beautifully the wonderful resources of nature, than this very process. It commences by a gradual species of separation, a kind of tardy, molecular dissection, by which the dead parts are thrown off from the living. The process is first commenced by the formation of a red line, surrounding the dead, and separating them from the living parts. After the expiration of a few hours, we observe this appearing as a minute furrow or groove, which gradually grows deeper and deeper, thus separating the parts. How then does this separation take place? It is through a process of absorption: and in order that this may take place, it is necessary that the molecules should be broken down and dissolved. This is exactly what does take place: the particles of living structure lying directly in contact with the dead are, by a vital act, gradually broken down, rendered liquid, and absorbed. It is thus that the furrow is formed. This process has been termed by John Hunter, "*dissective absorption.*" The time occupied by this stage will depend greatly upon the nature of the structures among which it takes place; no structure, however, can constantly, or eventually, resist its action. For example, in necrosis—which is a mortification of bone,—we have large pieces thrown off; or we may even have the spontaneous *amputation of a whole limb*. Such, then, are the changes by which a separation of the dead from the living parts is effected. Let us, in the next place, consider what goes on in the fifth stage, or that in which the lost part is *restored*. As soon as the detachment has taken place, the part assumes a florid red appearance; suppuration takes place; granulations appear; and the part is restored by a process, which shall be described when we come to speak of the healing of wounds by *granulations*. These then are the *local* phenomena which present themselves in a case of mortification.

So far as *constitutional symptoms* are concerned we would remark, that when resulting from acute inflammation, we have all the symptoms of inflammation. After the mortification has existed for some time, the cerebral symptoms begin to preponderate; diarrhœa supervenes; the vital powers are soon prostrated; syncope takes place on the slightest exertion; and the patient dies of a most malignant form of fever. Upon examination after death, we frequently find extensive lesions in the mucous membranes, inflammation, softening, gangrenous ulcers, &c. That this violent constitutional disturbance is caused by the entrance of a sanious or purulent fluid into the circulation, is effectually proved by Gaspard and Magendie, who experimented by injecting purulent and putrescent fluids into the veins of animals.

LECTURE XI.

TREATMENT OF MORTIFICATION.

We must now, gentlemen, speak of the treatment of mortification; and in this connection I need scarcely remark, after the explanations already made of the varied and diverse conditions under which this pathological state may take place, that great judgment and discrimination will be demanded in the application of our remedies. Mortification, we have said, is a destructive process; but from our previous description you will have gathered, that destruction of the parts may arise from causes totally dissimilar in their nature;—the results only are alike. Sometimes it arises from too much action—from hypersthenic inflammation; sometimes from atony, or want of power. Frequently there is deficient energy, as a perverted and deteriorated action of the constitution—impaired plastic force—attended with, or followed by, inordinate local reaction; sometimes, inadequate supply of blood, or a deteriorated quality of this fluid; obstruction of the vessels; deficient innervation; pressure; the introduction of a destructive poison, &c., all of which must be taken into account in framing our plan of treatment.

Whatever these conditions may be, the following indications should demand your attention: 1. To endeavor to prevent the mortification where it threatens, but has not yet taken place. 2. To arrest its progress, when already developed. 3. To promote the separation of the dead from the living parts, and 4. To repair the breach made upon the affected part: to which, I may add, a due attention to all such accidental complications as may be associated with the mortification.

In treating of the first indication, let us, first, suppose a case of threatened mortification from acute inflammation, arising either spontaneously, or from injury. Now, as the mischief proceeds here from excessive action, to prevent it, we must moderate that excess, so as to keep it within the bounds compatible with restoration. Antiphlogistic treatment, proportioned to the exigency of the case, and the constitution of the patient, is obviously the means for the fulfilment of our indication. General and local blood-letting; position; repose; farinaceous diet; mercurial and saline cathartics, in suitable doses, and at proper intervals; opium to allay pain, and insure repose; mild diaphositics; warm fomentations to the part; as an infusion of camomile, elder flowers, hops, poppy-heads, flax seed, &c.; or cold lotions, such as cold water or a weak solution of acetate of lead; in short, all the ordinary appliances usually employed to subdue inflammatory action, should be employed. But great judgment is necessary here in proportioning the means to the intensity of the case, and the resources of the constitution. When the latter is vigorous, your treatment should be energetic; but your procedures should always be tempered by this caution: that should mortification ensure in despite of all your efforts, heavy drafts will be made upon the powers of your patient, in the process of sloughing, and subsequent repair. Consequently, if you reduce the energies of the system below the point of recuperation, by inordinately active antiphlogistic treatment, serious mischief may be the consequence.

In mortification, threatened from other causes, this first indication must be met by remedies of a different class. Where debility is the cause, an invigorating treatment will be demanded. Generous diet; moderate stimulants—brandy, wine, ale, porter, ammonia, camphor, &c.; tonics, as bark, and quinine; artificial warmth to the part; stimulating lotions, frictions, and ointments; and spirituous fomentations, may all be demanded. But here, also, extremes must be avoided. The action of the part, although at first enfeebled, may, in the progress of the case, become excessive, an accident which would be greatly exasperated by undue stimulation. Here, too, opium will be a valuable adjuvant; and it will be necessary, also, to regulate the bowels and secretions, by mild alteratives and aperients; and to promote the action of the skin by mild diaphoretics, as the acetate of ammonia, Dover's powder, &c.

Where pressure is in fault, as from ligatures, position, mechanical adjustments, or other causes, this should of course be removed, and an equal necessity exists for getting clear of all other offending causes, as foreign bodies, poisons, &c.

But, unfortunately, you will not be called in many cases, until the mortification has already commenced, and in other cases, all your efforts to prevent it will fail. You must then direct all your resources to the fulfilment of the second indication; the arrest of the process of destruction.

In the selection of means to arrest the progress of mortification you must observe the same cautious adaptation of your remedies to the variable conditions of the part, and the dissimular causes giving rise to the destruction of the organized structures that we have mentioned before. Thus, in some cases, the extension of the mortification may be favored by a persistance of the excessive inflammation of the part. Here a continuance of your antiphlogistic remedies, guarded, as already recommended, will be obviously proper; and I need scarcely add, that under the same circumstances, and indeed in nearly all the conditions of mortification, opium in full doses, especially at night, to allay pain, control the morbid erithism of the part, and ensure repose, will be an invaluable remedy. My experience with it is confirmatory of the high encomiums bestowed upon it by Percivall Pott, who gives his testimony in its favor; and as the delirium so usually attendant in this condition is mostly of a symptomatic character, opium will be found the very best remedy for its relief. Aperients, alteratives, and the various other means suggested before, should also be continued, according to the circumstances of the case. In former times, mortification being considered a kind of putrifactive process, bark, as an antiseptic, was prescribed almost indiscriminately, as a means of arresting its progress. Where acute inflammation was the cause, this was a fatal error; but many of the moderns, running into the opposite extreme, have excluded it under circumstances where it is capable of doing much good. Thus, where there is deficient energy of the vital powers, bark, or quinine, alone, or associated with aromatics, and other bitter tonics; stimulants; generous diet, &c., will be invaluable remedies. I generally prefer to quinine an infusion of bark with orange peel, cascarilla, serpentaria, or the compound tincture of gentian.

In all forms of mortification, great importance is justly attached to local applications amongst the means of arresting its progress; but these, of course, should be varied according to attendant circumstances; the extent and depth of the mortification; the part affected, &c. When the process of destruction is yet incipient or of limited extent, the process being inflammatory, the following means will often be found useful, viz: cold, or tepid water dressings, pledgets moistened in a mixture of Goulard's Lotion with Alcohol, two parts of the former, to one of the latter. These should be renewed frequently, and to prevent too rapid evaporation, may be covered by a piece of oiled silk. Where the vital powers are more impaired, more stimulating applications will be demanded; and here you should bear in mind that, by these topical applications, it is your object to exalt the activity of the plastic powers in the adjacent living structures, so that favoring the elimination of an increased quantity of plasma, you overcome the destructive tendency of the disease, and substitute therefor, a restorative form of action, thus arresting the further extension of the mischief. With this view, spirituous lotions, camphorated almond emulsion; a mixture of camphorated spirits and olive oil; equal parts of tincture of aloes and myrrh; tincture of iodine pencilled upon the part; pyrolignous acid diluted with water; the mineral acids, also properly diluted; the chloride of soda and lime; the nitrate of silver in solution, or in cases of limited extent, in form, of crayon carried around the limits of the mortification, so as to fence it in, &c., will all be valuable remedies in particular cases. But great discrimination will here be necessary. Where there is still much inflammation, these applications will be obviously improper. As long as such is the case, the milder lotions already directed will be much more appropriate, and under the same circumstances, emollient poultices, grated potatoes, or carrots, or the fermenting poultice, prepared by stirring together, in boiling water, a mixture of baker's yeast, molasses or sugar, rye flour, peruvian bark, and charcoal, to which a small quantity of hop beer may be added. This eliminates, during the process of fermentation, a liberal supply of carbonic acid gas, which like the charcoal poultice, the chlorides &c., while it exercises a favorable influence on the vital parts, corrects the fetid odor.

But under more unfavorable circumstances, you will be obliged to resort to more potent measures. Of these, I will call your attention particularly to blisters, punctures, and incisions, as recommended in erysipelas; the actual cautery, &c. These remedies were much resorted to by the older surgeons, in the treatment of mortification, particularly the cautery, and other harsh appliances. Blisters were particularly recommended by Fabricius Hildanus, and their efficacy has been fully realized by modern surgeons. They should always be so applied as to act upon a considerable extent of the surrounding living structure, not as yet involved in the process of destruction. This may be done, either by covering the part with the plaster to the requisite extent, or by cutting strips of the requisite breadth, and applying them all over the part mortified, so as to circumscribe it. The cautery acts in the same manner, but it should be applied so lightly under ordinary circumstances as not to produce a slough. Punctures and incisions are only applicable to those cases where there is considerable œdematous infiltration, and here they should be practiced precisely as we have recommended in the treatment of erysipelas. In other cases, they will be apt to take on mortification, and thus extend the mischief.

When, by these measures, you have succeeded in arresting the gangrene, and a line of demarcation has formed, it remains for you to fulfil the third and fourth indications, viz: to promote the separation of the dead from the living parts, and repair the loss of substance. We need not say much upon these heads. As regards the first, the support of the constitution, the quieting of irritation by means of opiates; the regulation of the digestive organs and the secretions, with the continuance of the detergent lotions, antiseptic poultices, &c., will be nearly all you will have to do—Nature must perform the rest. Portions of sloughy integument hanging loose, may be cut away with scissors, and drawn away with the forceps; but all rude attempts to hasten nature's process of dissection should be avoided.

In proportion as the sloughs have been detached, granulations spring up, and healthy suppuration ensues. It will then only remain for you to conduct the treatment upon the same general principles that guide you in the treatment of any other suppurating and granulating surface.

But while these are the general principles of treatment to be observed in mortification arising from injuries, inflammation, &c., those varieties of the process which depend upon other causes, will require important modifications of your therapeutic procedures. In mortification dependent on obstructed circulation, whether from ossification of the arteries; inflammation and consequent obliteration of these vessels; impaired innervation, &c.; and especially when the disease assumes the form of senile gangrene, especially in old persons, beginning on the toe or foot, and extending upwards, I fear you will find all the remedies enumerated of but little avail.

Here there is a deficient supply of blood, and consequently of vital power; therefore, the indication is to promote an increase of both, by all possible means. Constitutional means of an invigorating character should of course be diligently employed; but, at the same time, so far as local treatment is concerned, I am inclined to believe, with Sir Benjamin Brodie, that the very best course is to invest the whole limb with thick bats of carded wool, so as to keep up the animal temperature; to use stimulating lotions, with gentle frictions to the upper portions of the limb, to promote circulation, and to apply the simplest dressing to the part. It is especially in this form of gangrene that opium was so strongly recommended by Pott, and here it often proves useful, through its influence in allaying pain, insuring repose, and promoting circulation.

When arteritis is in fault, copious blood-letting, leeches along the course of the affected artery, blisters in the same situation, &c., will be the appropriate remedies; but both François and Dupuytren have given too great extension to this mode of treatment.

When all means of treatment fail, amputation is the last resort. But in determining upon this, bear in mind the difference between traumatic and idiopathic gangrene. In the former, it is allowable to amputate, in urgent cases, while the mortification is still progressive; in the latter, never, until the process is arrested, and a distinct line of demarcation has formed.

*ESSAY No. 1.

BEDSORES.—HOSPITAL GANGRENE.—PYÆMIA.

Bedsores.

When a patient is obliged to remain in one position for the greater portion of the time, or during a long course of treatment, with the weight of the limb or of the body pressing on one or more points, we often incur the risk of a local destruction of tissue, to which the name of *Bedsores* has been commonly applied. There is first perceived a slight and evanescent redness of the part, which gradually assumes a darker appearance, becomes the focus of a passive and degenerate species of inflammation, and soon results in a local destruction of tissue, and the formation and separation of a slough. This is generally accompanied with but little pain, so that the destructive process has sometimes advanced considerably, before the attention of the surgeon is called to the fact. Wherever, therefore, there is the slightest probability of such an occurrence, the attendant should be continually on the alert to prevent it. The constitution of the patient is generally undergoing a severe trial of its strength, and this additional source of irritation may not unfrequently turn the scales against the powers of life. The *cause* of the sore is to be found in the continued pressure on the part. This pressure, after a while, interferes so materially with the vital processes going on in the tissues, which are already weakened in sympathy with the rest of the constitution, that the life of the part is destroyed, and we have an instance of local death or mortification. The dead tissues undergo the process of sloughing, and leave a granulating ulcer below, which, if circumstances are favorable, heals in the usual way. Sometimes these sloughs penetrate so deeply as to expose the bone, or as the nurses will tell you, "the bone comes through the skin." This may occur so extensively, or in so many localities, that the constitution fails to support itself under the constant drain upon its powers, and the patient consequently dies from the bedsores, though he recover from the primary affection. Should the mortification extend to the bone and expose it to the influences of the atmosphere, exfoliation of the same will pretty generally occur, with all its long continued and exhausting effects. Sometimes the lower portion of the spinal canal is laid bare by this process, and the patient dies from the injurious effect of such exposure of the vertebral nervous system. The parts most liable to be affected with bedsores are the shoulders, the sacrum, the trochanters, the heels, &c. Of course the circumstances of each particular case will point out what parts are most liable to be attacked, and the surgeon therefore should frequently examine those parts. The *treatment* is more preventive and palliative, than curative. As soon as we apprehend the production of a bedsore, we must endeavor to remove or alleviate the pressure, and to keep up the healthy action of the tissues. The skin should be kept clean and dry, and the part may be occasionally washed with some spiritous lotion, such as spirits of camphor; or, as recommended by Erichsen, the spirits of wine may be used, either pure or with the addition of two grains of the bi-chloride of mercury to the ounce; and it has been recommended to protect the whole surface threatened with a piece of adhesive strip. The pillows should be so arranged as to relieve the parts as much as possible from pressure; the water-bed, if attainable, should be used; and the position of the patient must be changed as often as the circumstances of the case will prudently admit. These are, for the most part, preventive measures. When the skin becomes chafed, and the disease is fairly developed, the spot should at first be dressed with some stimulating application, in order to assist the adjacent parts in their efforts to form a line of separation, which will limit the process and hasten the formation of the slough. Basilicon ointment, balsam of Peru, or any of the moderately stimulating unguents, will answer for this purpose. But too much attention must not be paid to the local affection exclusively; the general health must also be carefully attended to; and if we succeed in keeping this up to a fair standard, the local affection will pretty generally prove tractable. We always fail in saving the patient, because we fail in our ability to support his strength. When the slough is formed, its removal may be hastened by the application of poultices, which should be medicated with some disinfectant, such as charcoal, or what is better, the chlorinated solution of soda of Labarraque. The resulting ulcer should receive the treatment appropriate to ulcers; it will generally prove a simple one, and need nothing more than a slightly astringent application.

---

* By the Editor.

Hospital Gangrene.

This affection is known also by the names of *Gangrena Nosocomialis*, *Sloughing Phagedæna*, *Pulpy Gangrene*, and *Contagious Gangrene*. Both the frequency of its occurrence and the intensity of its phenomena have declined of late years. It was formerly one of the scourges of the hospitals, both of the armies and in the cities: its prevalence to any very serious extent is now rare. "It seems to have been known and described by the old writers, as Ætius, Paulus and Avicenna; but was not noticed, prominently and distinctly, till during the late wars, in the end of the last century and beginning of the present. Then, from the crowding of wounded men in hot, dirty and confined apartments, perhaps after long and rough carriage, with bad food, mental depression, and insufficient attention to dressing and to cleanliness, foul degeneration of sores became not uncommon, and Hospital Gangrene came forth in all its virulence, as the graphic pages of Hennen, Blackadder and Boggie sufficiently testify."* The symptoms which characterize the affection are very similar to those of a phagedænic ulcer, ingrafted upon a simple ulcer or a wound. When it is about to attack a wound or ulcer, the part becomes painful and inflamed; the discharges become sometimes arrested, or at least diminished; and the surface becomes covered with grey spots of gangrene, which rapidly spread and deepen, till a more or less extensive slough is formed. The skin around takes on an unhealthy, livid hue, and a stuffed, swollen appearance. The edges of the sore are rigid and everted, and are apt to assume the form of a circle; the slough is pulpy, and not easily removed, the process of its gradual separation from the subjacent tissue being accompanied with an unhealthy-looking and exceedingly offensive discharge. The pain, which persists through all this, is of an exceedingly acute and burning character; nor is the trouble over when the first slough is at last detached, for the same process is apt to be repeated, and a larger circle is taken in. Hemorrhages, in this interval, are apt to occur from the florid surface exposed, as well as from any vessel through whose wells the destructive process may have extended; and this hemorrhage may sometimes be so profuse as to prove fatal, if unchecked. According to Hennan, it is most apt to come on about the eleventh day. More recent wounds, and those sores of a non-specific character, are said to be most liable to be attacked by this affection. No tissue can escape it, though the arterial structures appear to be able to resist the morbid action longer than any others, and those individuals who have been under the influence of mercury, appear to be peculiarly liable to it.

---

* Miller's Principles of Surgery. American edition, 1852, p. 378.

The constitution is very early affected by the disease. Sometimes the febrile symptoms even precede the local affection, as is said to be the case in some forms of hospital erysipelas. The general symptoms are at first of an inflammatory, but very soon degenerate into a typhoid, or irritative character; in weaker constitutions they are never inflammatory, but adynamic from the beginning. The nervous system seems violently disturbed, and even those patients who have formerly shown the greatest fortitude become weak and childish. There is great restlessness, irritability of stomach, costiveness, and loss of appetite. In some cases it attacks parts that are not wounded, commencing in little blisters or vesicles, and, sometimes rapidly, sometimes slowly, extending around and eating down.

The causes of these epidemics are difficult to define; the particular cases may be produced either by direct contagion by means of dressing, &c., which have been used for other cases, or by the exposure of the part in an infected atmosphere. The disease is one of crowded and impure localities, though it would seem from the following extract, from Erichsen, that such is not always the case; which author seems also inclined to draw a parallel between the causes of this affection and those of some other epidemics. "In the winter of 1851, several well marked cases of this affection, three or four of which were of a very severe character, occurred among the out-patients at the University College Hospital. In these cases, as in many others, it was probable that the disease was occasioned by some atmospheric or epidemic influence. At this particular season, influenza, erysipelas, and phlebitis, were also very prevalent. This had been observed at the time of the first occurrence of the disease at our hospital, in 1841, and I think it is difficult not to recognize a similarity of cause in these different affections."

The main object in the management of an epidemic of this kind is of course the arrest of its spreading. For this purpose the utmost cleanliness and care must be observed; the vessels employed should be thoroughly scoured after use, and the bandages destroyed that they may not be re-applied on an uninfected subject. If possible, those who have not contracted the disease should be removed; and the infected apartments should be thoroughly ventilated and kept clean. The indications to be pursued in the treatment of the individual cases are both local and general. We must attempt to stop the progress of the local affection, to regulate the action of the general system, and to support the vital powers when they begin to fail. The most important indication, however, is to stop the local affection; for if this can be done in time, the constitutional symptoms will very soon disappear. The constitutional treatment, however, must not be neglected, especially as the disease progresses and the vital forces begin to fail. All sources of intestinal irritation should be throughly removed, and opiates, and, very soon, tonics and stimulants must be resorted to; the former to calm the nervous symptoms, and the latter to sustain the strength. Erichsen reports that he has found considerable benefit from the use of ten grain doses of the chlorate of potash in decoction of bark, every six hours, adding to each dose, if much prostration is present, from five to ten grains of the carbonate of ammonia: this will probably prove a very good prescription. The compound tincture of bark, or some preparation of columbo, or quinine may be used, adding such *stimulants* to these tonics as the particular condition of the constitution may demand. The local treatment is pretty much the same as for the phagedænic ulcer. Either nitric acid or the actual cautery should be *thoroughly* applied; and if necessary the application should be repeated, until the diseased action is limited. This should be followed by opiate and soothing applications, such as the watery extract of opium and chlorinated poultices: and if the hemorrhage should at any time threaten to become dangerous, it will become necessary to resort to the proper measures for arresting it, such as the ligature, cautery, &c. Formerly this disease was exceedingly fatal: it is less so now; though still the proportion of mortality from it is very high.

Pyæmia.

As the name implies, this disease consists of a formidable change in the blood; and if *any* affection is to be considered a true blood disease it is surely this. As may be easily understood it is a very serious affection. It is generally—according to some authorities, *always*—preceded by some species of inflammation which has already advanced as far as the suppurative stage: but we will recur to this consideration when we come to speak of the ætiology of the disease. Let us now examine its phenomena, or its *symptoms*. You have a patient, perhaps perfectly well in all other respects, but under treatment simply for some suppurating wound, which may cause you no anxiety at the time, nor be a source of any great deal of annoyance or pain to the individual. Suddenly he is taken with severe chills, which in some cases assume a certain degree of periodicity in their attacks, with an accompanying, or rather an intervening, fever: the pulse gets small and frequent, the breathing rapid, the skin dusky or yellowish; and this color will often extend to the conjunctivæ: the countenance assumes an expression of great anxiety, for the whole system is instinctive of its danger; and the breath is apt to be of a sickly, purulent odor, similar to that exhaled in some low forms of fever. The wound, meanwhile, is apt to take on an unhealthy appearance; its secretions dry up or assume an ichorous character; and it is apt to slough and extend, forming a foul and unhealthy ulcer. Depression soon comes on; the patient falls into a stupor, or low delirium, from which, however, he is easily roused; sordes gather on the teeth; a brown coating covers the tongue; the pulse beats with an uncertain and fluttering action; the respiration becomes more and more frequent and difficult; the skin and conjunctivæ assume more and more the icteric tint of jaundice; and "usually from the sixth to the tenth day, but sometimes earlier, diffuse suppuration begins to take place in different tissues, joints and organs. This may occur in the viscera without occasioning any material pain; if seated in the cellular tissue, or in the substance of muscles, there is much doughy swelling, with some redness; if in the joints, the swelling is often considerable, the pain usually intense and of a very superficial and cutaneous character, the patient screaming with the agony he suffers. These pains, which are chiefly seated in the knees, ankles, hips and shoulders, often simulate rheumatism very closely."* The symptoms of approaching death now show themselves; and the patient sinks, after falling into a condition of extreme emaciation and exhaustion. Profuse sweats, diarrhœa, subsaltus tendinum, failure of voice, &c., &c., close in the scene. According to Erichsen "Death usually takes place about the tenth or twelfth day, though it may occur as early as the fourth, or the patient may linger on for six or seven weeks." M. Sedillot, as quoted by Miller, says that "the patient dies from the fourth to the eighth day."

The symptoms enumerated generally present themselves quite suddenly; while on the other hand, the disease may insidiously progress some distance, before many of these phenomena make their appearance. Sometimes it is preceded by the appearance of an unhealthy species of inflammation, either at a wound, or somewhere else—in the form of erysipelas, anthrax, phlebitis, inflammation of the absorbent vessels, injuries of joints, &c. Such affections are apt to be its accompaniments, or precedents, or both. Sometimes the attack, as already stated, is very invidious. There is no violence of chill or very evident distress; but a form of intermittent fever, accompanied with considerable prostration, presents itself; while the wound may continue of a healthy appearance, and the patient may not seem to suffer much distress. After a while, however, the skin and conjunctivæ begin to get discolored; some joint gets swollen and painful; pleuritic effusions begin to affect the breathing; some symptoms of pneumonic inflammation present themselves; and the disease gradually becomes apparent.

After death, abscesses,—in some places diffused, in others somewhat circumscribed,—are found in all their different tissues, organs, and joints. They are almost always found in the lungs;

---

* Erichsen's system of Surgery, Am. ed., page 369, 1854

very frequently in the liver, the spleen, the heart, among the muscles, and in the joints; and occasionally in the other organs, and even in the substance of the muscles.

The organs, and especially the lungs, are sometimes completely riddled with these abscesses; and the microscope shows that the blood—even when examined during life—is contaminated with pus-corpuscles. We insert the following description of its microscopic appearances from the pages of Erichsen already so often quoted:—"On examination under the microscope it will be found that, besides the ordinary red globules, the blood contains, often in large quantities, corpuscles, that in some cases closely resemble the ordinary white ones of the healthy blood, and at others present such exact similitude to the pus-cell, that the most practiced eye fails in detecting a difference. These corpuscles may be few in numbers, and at other times so abundant that they occupy the field of the microscope to the exclusion of the red. The existence of these corpuscles in the blood, which I believe will invariably be found on careful examination, more especially in that taken from the larger veins, constitutes apparently one, if not the essential element of the disease. That they are true pus-corpuscles, in many cases, would seem to be probable from their microscopic appearances; in others, again, they do not present the true character of the pus-cell, differing from it in the shape, or in the absence of a nucleus, and in their more irregular outline; resembling indeed more closely the white corpuscles, or some of the ill-developed granulation or exudation-cells that are met with in cold or lymphatic abscesses occurring in cachectic constitutions. Whatever differences of appearance these corpuscles may present, they can best be compared to those pus-cells that are found in many unhealthy abscesses, and more especially in the diffuse purulent collections occurring in the cellular tissue of the joints in this very disease, and like these I think we must look upon them as products of inflammation, though perhaps of a low and a plastic form."

From the description we have given of the phenomena attending this disease it will be apparent, that in some cases the diagnosis will be easily arrived at, while in others it will for some time be difficult to tell what you are dealing with, till the occurrence of suddenly formed abscesses, which seem to appear as if by magic, without any premonitary inflammation of the part, the sweetish fetor of the breath, the extreme prostration, the discoloration of the skin; the continuance of the chills without a corresponding height of fever, the pulmonary symptoms, &c.,—some of them or all of them, occurring together—open your eyes to the fearful condition of your patient.

The *ætiology* of the disease now presents itself for our consideration; and—as is common, and but natural whenever this difficult feature in the philosophical discussion of any subject presents itself—we find here a considerable difference of opinion.

It has been affirmed by some that the blood is infected by the *absorption* of the pus into the circulation; but this notion is now abandoned, as such an absorption has been proved to be impossible from the relation of the size, of the pus-cell to the structure of the capillary tubes, they being too large to pass in. By others it is contended that the infection takes place through the orifices of ruptured veins which open into some abscess, or on some suppurating surface, where the discharge has been suffered to remain, or has been confined by the dressing.

A third—and at present the most popular—theory is, that the blood receives the pus-cells from the inflamed inner surface of a vein or absorbent, or that *suppurative phlebitis* is invariably the cause. A fourth theory is that the disease is always independent of phlebitis, and is essentially and from the beginning a *blood disease*. This last view was adopted, and first maintained by Tessier; while Hunter, Berard and others contend that a distinct relation can be traced between pyæmia and suppurative phlebitis, and regard the former as dependent on the latter; and Mr. Henry Lee contends for a previously deteriorated condition of the blood as necessary to the disease. Erichsen does not deny that in some cases phlebitis is the cause of purulent infection, and grants that this explanation would be conclusive, "if it could be shown that phlebitis was the only or even the most frequent form of diffuse inflammation occurring in connection with pyæmia, and that it always occurred as a precursor or concomitant of the blood affection:" but his experience does not warrant him in adopting this opinion, having frequently, in the dead-house, found conclusive "evidence of diffuse inflammation as well as of phlebitis." He affirms that in some cases no evidence of phlebitis could be found, even when special attention was directed to its detection; and, therefore, comes to the conclusion, to express it in his own words, "that pyæmia, though frequently co-existing with, may occur independently of suppurative phlebitis, and cannot in all cases

LANE LIBRARY

be necessarily considered a consequence of that disease." That the origin of the disease is always in the blood itself, M. Sedillot has disproved by pointing out the fact, that a disease can be produced in all essentials the same by the injection of pus into the circulation; and the evident, though not invariable connection, of suppurative phlebitis, or some other local suppuration with its attack is also inconsistent with such a view. Erichsen attempts to explain the cause of the purulent condition of the blood by supposing that a change is induced in the same by its passage through the "unhealthy-inflamed" tissue; and in view of the facts — that the blood in passing through a part which is sthenically inflamed will undergo certain changes well known, such as the formation in it of a large quantity of plastic filamentous fibrine, and that in all cases of pyæmia it is "invariably necessary" (as he believes) that a local inflammation of a purulent character or tendency shall pre-exist, in a constitution, too, that is broken, "and of that kind in which the corpuscular or aplastic lymph commonly forms"—he concludes that, "it is not difficult to suppose that the blood in circulating through the part so diseased, instead of undergoing those peculiar changes that are impressed upon it in its passage through tissues that are sthenically inflamed, may be subjected to alterations in composition of equal extent though of far different kind;" which alterations result in, and are therefore the cause of the purulent infection.

This theory is plausible enough, but unfortunately it is not sufficiently comprehensive to take in all the facts; it may account for some of the cases, but it cannot include all, and therefore fails to meet the requirements for a scientific generalization, or a law. For illustration, it has been proven by Sedillot, that pus injected into the blood of an animal will produce pyæmia. In this case, where is the *local asthenical inflammation*, which was necessarily to have pre-existed, and where the proof of a broken constitution "of that kind in which the corpustular or aplastic lymph commonly forms?" For this theory to be the correct one the result should also be more uniform than it is. If the disease is *always* produced by changes induced in the composition of the blood of a broken down constitution in its passage through a part asthetically inflamed, whenever these conditions obtain the result should at least *generally* follow, and a case of pyæmia be developed. But such is by no means the law; the instances in which the disease is produced, under such conditions are rather exceptional than otherwise. We very frequently have quite extensive local inflammation, of a low character, and in a broken-down constitution, without pyæmia resulting. In order to sum up our views in this matter, let us take a condensed view of the whole subject. In the first place, we have a disease, which, in its full development, we all agree to call pyæmia, and to consider, (at least in that stage,) as a *blood disease,* a case of purulent contamination of the circulating fluid. Never mind how produced, it is now essentially a blood disease. We examine this fluid, and invariably find it to be in an abnormal condition; so much so that we must conclude, that, if the blood is not diseased, the case cannot certainly be one of *pyæmia,* i. e. pus in the blood. Next: how is this change produced? How does the pus get there? The diverse opinions entertained in relation to this query may be ranged under two heads. The advocates of one division contend that the disease is, *ab initio,* a blood disease; and therefore, attempt to account for the origin of the pus in the blood itself: while those of the other class attribute the infection to a source *external* to the blood. Those who advocate the former opinion have no cause to differ among themselves, but simply rest upon the assumption (without any conclusive proof however,) that the disease originates in the blood; while those in favor of the latter opinion do differ among themselves in having several—and generally exclusive—methods of accounting for the introduction of the pus.

The opinion that it is absorbed by the blood-vessels from a suppurating tissue is no longer worthy of notice, as has already been shown.

The supposition that it may enter through some ruptured or divided vessel is not unreasonable; for it is not much more difficult to conceive that pus may occasionally enter a vein or lympathic, and flow with its current than to realize the fact that air sometimes does so. For example: an abscess may be so located as to press against the side of a vein, and if there should occur—from absorption or otherwise—a solution of continuity in the wall of the vessel at that point, we may well conceive that the globules of pus may be driven in, and carried along with the current. In some instances of purulent infection, there is no doubt but that this may be the process. Another, and, as stated already, the most popular theory, is that the pus becomes mingled with the blood from the inflamed internal surface of some vein. This too may happen, but what proof is there that this suppurative phlebitis is the *exclusive* source of the purulent contamination, as has been contended by some. The disease is, pus in the blood, and surely there is no reason why the pus may not enter in by more than one way. We often have cases of pyæmia without any phlebitis, as we also have phlebitis without pyæmia.

In examining, therefore, these various opinions, and giving to each its due weight, it seems reasonable to conclude that we have not sufficient grounds for adopting any one of them to the exclusion of all the others. That the disease is simply a purulent contamination of the blood, was proved by Sedillot's experiment. Any cause, then, which is capable of introducing pus into the circulation may produce the disease. The pus corpuscles cannot be absorbed; but they may in some cases enter through the ruptured walls or divided extremities of the vessels; in others they may be washed from the inner lining of an inflamed and suppurating vein or lymphatic; or in others again they may result from some change induced in the vital properties of the blood itself; but how this change is effected, or that the pus-cells are ever produced in this way, we have no satisfactory proof. So much for the cause of the disease. Let us now see what are the results of this condition of the vital fluid. In speaking of the symptoms and their causation most of these results have already been hinted at: they are necessarily most disastrous to the whole system. It is more than probable, that the *vital* properties of the blood itself are seriously impaired by the presence of this abnormal element; but, however that may be, the palpable effects on the various tissues of the body are enough in most cases to destroy life. The capillary system of blood-vessels is not intended for the transmission of pus-corpuscles, provision being only made for the passage of normal blood-disks. The pus-globules are by far too large to pass through these minute tubes, and the consequence of their presence in the circulating fluid is, that they obstruct the capillary circulation, and cause a congestion of the part, which impairs or puts an end to its vitality, and therefore causes it to *suppurate*. Hence, as might be expected, we have abscesses forming in the lungs, in the liver, in the spleen, in the cellular tissue, every where; but most frequently in those parts in which the capillary system is most delicate. The vital processes in every portion of the system are more or less interfered with, and life is as it were crowded out by these intruders. The blood in its physical characteristics is necessarily changed. According to Erichsen, "it is thin, dark colored, and after having been drawn from the body, forms a loose spongy coagulum, from which a moderate quantity of rather turbid or milky-looking serum escapes." Its appearance under the microscope has been already explained. With the fountain of life itself so impure, it is but reasonable to expect that we will find almost any part of the body affected. All the tissues, serous, cellular, nervous, muscular, mucous, may be affected; even the arachnoid has been found in a purulent condition; and abcesses are sometimes found in the brain, and in one instance, even in the prostate gland.

Of course we can have but little to say of the *treatment* of such an affection. We find that our patients occasionally *recover*, but this is not often the case. When the abcesses form and are accessible, they should be evacuated, as a matter of course; while all we can recommend in the way of treatment, is the judicious pursuit of a strictly tonic, and towards the termination, as the strength fails more and more, a stimulant course of medication; adapting the measures carefully to the urgency of the symptoms. A generous, high diet should be allowed, if the patient's appetite will permit. Quinine in pretty full doses, four to eight grains every five or six hours, has been recommended, and might possibly enable some cases to recover. When great prostration is apparent, the volatile stimulants may be freely and persistently used, in the hope that possibly the immediate cause of the prostration may be of a temporary nature, or at least in part so, in which case the stimuli may enable the constitution to react. In short, all our efforts are to be directed towards sustaining the strength of the patient, in order that, if possible, *he* may *recover*. *We* cannot *cure* him.

The prognosis is thus summed up by Miller. "*Some* patients emerge happily, bearing nothing but the scars of external abscesses; others escape with life, but permanently changed in both trunk and limb; *many* sink and die." S. L.

LECTURE XII.

ERYSIPELAS.

Definition—Varieties—Symptoms—Treatment of Erysipelas.

I design, on the present occasion, to call your attention to that form of inflammation known as *erysipelas.*

You will remember that, when discussing inflammation, I took occasion to divide the subject into healthy and unhealthy inflammation. Now, this may appear paradoxical, but you should remember, that there are a number of circumstances which tend to vary the vital process. The condition now to be considered is one of those varieties of the inflammatory process; for, though inflammation, under all circumstances, is much the same process, yet, in that modification about to be considered, the attending phenomena are widely different from those of the common phlegmasiæ.

Let us see in what these phenomena consist; but before I go on, it is a matter of some importance for me to premise that by erysipelas I mean a pathological condition by far more limited than that to which pathologists generally apply the term. But, to be more explicit: If you turn to any one of your books, you will find that authors divide and subdivide this condition in such a manner, as to render it entirely disconnected and unintelligible. They speak, for example, of erythemoid erysipelas, characterized by a rashness of the skin; and again, of phlegmonous erysipelas, where not only the skin, but also the subcutaneous cellular tissue is affected, and sloughs are formed of greater or less extent. But, in my estimation, this last is a totally distinct disease, and has with the other no connection whatever. That I may not be misunderstood, allow me to say, that by erysipelas I mean an *exanthematous affection*, as described by authors on cutaneous diseases, this being accompanied by certain constitutional derangements. Within this limit I restrict my definition of erysipelas. The other conditions which have been described as such, I look upon as entirely distinct diseases. For the sake of convenience, however, I shall describe them as forms of *pseudo, or false erysipelas*, only because they have been mentioned by authors, and not that I regard them as at all connected.

Having premised thus far, let us now give our attention to *erysipelas vera*—that peculiar exanthematous affection, characterized by a preternatural enlargement of the vessels of a part and of the papillæ of the skin, with a tendency to the development of small vesicles, filled with a fluid, and gradually increasing in number, until they present the appearance of a rash, pursuing a definite course, and terminating for the most part with desquamation, and nearly always associated with constitutional symptoms.

Now, this erysipelatious inflammation presents itself in various degrees of intensity. In some cases it is very slight, presenting only a light blush of redness, which passes imperceptibly into the surrounding line, and, again, it may be well defined, and the skin may even present a prominent appearance, looking as though it hung over the surrounding parts. Very frequently it commences by small red spots, or blotches, which gradually increase, and approach each other, until finally they unite. In some instances the process is very slow, the affection appearing for some time to remain almost stationary; while in others, on the contrary, it has been known to be very rapid, and, in the short space of twenty-four hours, to have extended over the whole body. As the redness increases a liquid is exuded, of a serous character, deficient in fibrin, and giving rise to no nucleated, organized cells, but forming a series of straw-colored vesicles; and these, gradually running together and uniting, cause the detachment of the cuticle. As this advances, the color grows darker, the cohesion of the skin is affected, and its vitality often becomes so much impaired as to result in sloughing.

Such are the local appearances in erysipelas *vera*. But I must here state a peculiarity which sometimes presents itself. Although the inflammation appears sometimes to remain almost stationary, or extend slowly from point to point, as though spreading from a centre, yet on other occasions it leaps about from point to point, going from one organ to another, without our being at all able to say why it should thus suddenly change its abode.

As regards the *constitutional symptoms*, we find that generally there is more or less febrile action—ushered in by chill, languor, heaviness, loss of appetite, and a clammy, disagreeable taste, with dryness of the mouth—these symptoms all showing a perversion both of innervation and secretion. Sometimes pain in the limbs and derangement of the stomach precede the attack by some hours; but as soon as febrile action is established, we find that the symptoms differ widely from those of common symptomatic fever.

There is greater prostration, and more gastric irritation: the tongue is red, with thin contracted borders, the center being thickly coated; the thirst is frequently beyond control; delirium comes on early; and we have wakefulness, restlessness, vigilance, and very soon a kind of listless coma; it is very difficult to arouse the patient; the tongue becomes more dry, brown and shrivelled; sorder covers the teeth; the breath becomes fœtid; and, in short, we have presented to us a train of *typhoid* symptoms. In some cases, however, we have only a slight fever for a few hours, the urine becoming profuse, perspiration bursting forth, and the disease resolving itself by a true crisis. In other cases its advances may be more obscure—the disease appearing to stand still for some time without any perceptible change in the symptoms. Now, here you should be on your guard; for if the disease is not arrested, the strength will be rapidly exhausted; and your patient will suddenly sink, as though from malignant typhus.

In the next place, let us give our attention to the causes of erysipelas. These are of widely different characters; but, whatever the existing cause may be, there is always a predisposing tendency, residing in some peculiar and unknown state of the constitution. This predisposition may be produced by the depressing influences of crowded ships, hospitals, goals, cellars, &c.; the vital powers being so acted upon in their localities, as to leave the system very liable to take on this form of inflammation.

There is every reason to believe that, under certain circumstances, erysipelas may become contagious. When a number of human beings are crowded together in badly ventilated apartments,—where cleanliness is disregarded,—where the diet is of an unhealthy character, and where the habits of the individuals are bad, a kind of erysipelatous atmosphere seems to be generated: so that if any one under its influence is exposed to an exciting cause—a slight abrasion even, or a mere scratch—an attack of erysipelatous inflammation may result,—and if the subject of the attack be not removed, an *epidemic* erysipelas may soon be developed. This epidemic influence is sometimes so well marked, that surgeons in hospitals have been deterred, under such circumstances, from performing ordinary operations; and have even feared to perform venesection. These, then, may be regarded as the leading characteristics of erysipelas *vera*.

In accordance with general custom, we next pass to a consideration of pseudo erysipelas—usually called phlegmonous erysipelas.

In this form of inflammation, the disease is not confined to the skin, but sooner or later attacks the subcutaneous cellular tissue. It, indeed, sometimes arises there, and the skin is not affected until the disease has reached an advanced stage. The part soon becomes puffed, and doughy to the feel, and pits upon pressure—showing an impairment of the elasticity of the structures. The skin over these parts presents red spots, which, upon careful examination, will be found to represent distended vessels. The lymphatics appear as bright red stripes, or streaks, often very numerous, and—as it were—mapping off the limb. An effusion takes place in the course of these vessels; and, as this increases, the surrounding cellular tissue becomes more and more involved, and soon sloughing ensues. No healthy suppuration is seen during the whole process, but the fluid is of a sanious character. This pseudo erysipelas presents itself under many shades and modifications. One of these is diffused cellular inflammation, or phlegmonous erysipelas. What are *its* peculiarities? The redness, starting from some point, is observed to follow the course of the vessels,—the lymphatics, as well as the veins, being soon involved in the inflammation. Thus, in common dissecting wounds, the poisonous matter being forced into the structures—like any other virus—seizes upon the radicles of the veins and lymphatics, and produces inflammation along their course; the coats of the vessels becoming affected, they are obstructed, and the death of the part follows. The cellular tissue being most liable to take on inflammatory action, is soon involved; and we not unfrequently meet with cases in which the sloughing burrows under the skin, lays bare and penetrates between the muscles, and even injures the bone,—and yet the integument remains not at all affected. We divide the *causes* of false erysipelas, in a general way, into local and constitutional; but even where the immediate cause is local, it is likely that the vital powers are already impaired, that some peculiar diathesis exists, that some injurious habit has been indulged in, or that the patient has been exposed to the unhealthy atmosphere of some crowded locality. The constitutional symptoms, I have omitted to remark, are like those found in erysipelas *vera*.

We will now turn our attention to the *treatment* of erysipelas, of both kinds. There exists no question upon which there is a greater difference of opinion than this.

Some surgeons regard it as a purely inflammatory process, and therefore requiring measures entirely depletive; while others regard the inflammation as of an adynamic character, which being the case, the first duty of the surgeon would be to build up and support the powers of the constitution. I apprehed that the whole difficulty arises from confounding two diseases, and also from not attending to the circumstances of each particular case. Now, so far as the treatment of true erysipelas is concerned, I would remark, that it must be varied with each particular case. If the tongue be loaded, and there is no undue redness of the borders, nor any tenderness at the præcordia—in short, where there is no gastric irritation, there will be found no remedy more useful than a mild emetic. Twenty grains of ipecac, with one of tart. antimony, will often produce beneficial effects. Emetics, in this affection, were very much relied on by Dessault. They are not, however, of universal application. It would be unwise to use emetics where the tongue is dry, and red on its margins and tip; or when the patient is annoyed with thirst, vomiting, diarrhœa, &c., as these symptoms show a tendency to gastric inflammation, and an emetic would only serve to increase this condition. The bowels should be emptied by a mild cathartic, thus exciting secretion, and securing a revulsive action; but the drastic purgatives should be avoided. Five to ten grains of calomel at night, combined with a grain of hyosciamus, or opium, and a small amount of ipecac, may be administered, and followed by some aperient next morning, which may be aided in its action by an enema. We must also attend to and restore the functions of the skin. Hence diaphoretics become useful, and whether these should be stimulating, or otherwise, must be determined by the case in which they are to be used. Where there is pain, and no determination to the head, small doses of Dover's powders will be found beneficial, combined with calomel. Tepid ablutions over the whole surface will often act in a salutary manner; and for this purpose, we make use of solutions of opium, infusion of poppy-heads, elder flowers, camomile flowers, &c. With reference to ablutions, I should state that many object to any moisture being applied in this affection. I, however, have employed those of an unirritating character for many years, and have seen them do good. There are also a variety of solid substances, which when applied in the form of powder, and sprinkled over the part, are found to produce a soothing effect—as flour, chalk, starch, arrowroot, and many others. These, then, are the means principally useful in the treatment of *erysipelas vera*. You will perceive that I have not mentioned any of the stimulating lotions: these will be spoken of in the treatment of false erysipelas, which will be considered at our next meeting.

LECTURE XIII.

PSEUDO ERYSIPELAS—TREATMENT OF—ANTHRAX, OR CARBUNCLE—CAUSES—SYMPTOMS.

Treatment.

In the observations made yesterday, we had reference only to erysipelas *vera,* properly so called.

We propose now to go on more in detail, and to mention those steps which are proper to be taken in pseudo, or false erysipelas. Now, when you observe that the part is becoming doughy, and pits on pressure, with tumefaction and diminished elasticity of the skin, it will be a matter of great importance to be prompt in your measures, as in such cases there is a great tendency to sloughing, and an undermining of the skin. The constitution too, is apt to become quickly prostrated, for the contaminated fluids poison the circulation, and life is soon endangered.

The first remedy to be considered is, the abstraction of blood. Upon this point there is a difference of opinion; some recommending free blood-letting, both general and local; while others contend for the use of stimulants, tonics, opium, &c. I apprehend that both parties may, under different circumstances, be right, for, sometimes, we will find the disease taking on a high inflammatory character, or, on the contrary, at other times it may assume a truly typhoid condition. Hence, you will see the importance of forming a correct estimate of each particular case, especially with regard to the nature of the epidemics with which you may have to deal. Where inflammatory symptoms run high, and there is no cause for debility, either from previous disease, or from a weak constitution—where, in short, the patient is strong, bleeding will frequently be useful, particularly where it exists in the neighborhood of important parts, rendering delay dangerous. When the face is affected, and the eyes are tumefied and closed; when the neck is involved, and brain symptoms appear early, bleeding, from the promptness of its action, will be found exceedingly useful; but when the disease is engrafted on a constitution which is broken down by disease, or where it assumes a typhoid character, so far from relieving your patient by blood-letting, you will, by lowering the already weakened vital powers, place his life in imminent hazard. Here it should be our object, as much as possible, to sustain the vital energies, and to combat the symptoms as they arise. There is great difference of opinion with regard to the application of leeches. While some recommend that they should be applied directly to the inflamed part, and that bleeding from the bites should be promoted by warmth, others regard their use as dangerous. The medium course is, perhaps, the best, and I can lay down no rule for their use which shall be found better than that already given for general blood-letting. There are cases in which important benefit may follow their use; but under other circumstances, they may do great harm; as, for example, where the disease is located in any of those highly cellular tissues that are so liable to infiltration, as the palpebræ of the eye, or the cellular parts of the scrotum.

But to proceed to other remedies. Where the skin takes on that streaked or lined appearance, mentioned yesterday as corresponding with a constriction of the deeper vessels, the most important remedies are of a local character. These are very various, and it will be necessary to mention some of them minutely. You will remember, that when speaking of the treatment of gangrene, I mentioned the expediency of bounding the progress of the disease by the use of nitrate of silver: in the disease now under consideration, the use of this salt, for the same purpose, will frequently be found to succeed. Taking a pencil of this caustic, moisten and apply it immediately around the diseased structure, being careful that the caustic is always applied to surfaces not diseased, and you will sometimes thus succeed in arresting the disease, which gradually advances to this barrier against its progress, and there stops.

Unfortunately, however, this is not always the case: in some instances, the inflammation will progress and continue to extend, entirely regardless of the action of the caustic. As a remedy somewhat analogous to the caustic, but in my opinion much more successful, I would mention *a blister*, applied in such a manner as not only to rest on the diseased part, but so as also to extend somewhat over it, upon the surrounding healthy structures. It appears to act in a manner not easily understood. On the one hand, it stimulates and excites the secretion of the skin, relieves the tension of the vessels, and, promoting the elaboration of plastic lymph, frequently forms a barrier to the extension of the disease; and, on the other hand, it disposes the parts to take on a healthy suppuration, and may, not unfrequently, convert the inflammation into a circumscribed abscess.

Where this remedy is admissible, it is often very efficient; and where the surface is not too extensive, it is by far the best application that can be made use of. It is an old remedy, and one which is now also much used. The blister should be large enough to make a strong impression. Among the local remedies, I must also mention *puncture* and *incision*.

The first we owe, as a method, to Dobson. It is a very simple remedy; and it sometimes acts very promptly in relieving the part of the fluid which it contains. There are circumstances under which you should never fail to resort to it, or to the plan of making a few incisions into the part; the former is generally to be preferred. I would also mention the utility of some mechanical support. Where the inflammation exists on a limb, the best method of using it is by means of a roller bandage, as first recommended by Dudley and Velpeau. Taking an ordinary roller bandage, and commencing at the extremities, apply it smoothly and evenly upward, over the whole limb; and if the skin is irritable, it will be well to protect it with soft lint: indeed it will be well under all circumstances, so to fill up the irregularities with lint, as to make the bandage press evenly on all parts. So efficacious is this mechanical support that you will frequently find, that a few hours after the bandage is applied, the vessels becoming disengorged, the bandage becomes so slack as to require a re-adjustment; and thus you will frequently succeed in bringing about a series of changes, by which the disease will be terminated by resolution. Even when the disease is considerably advanced, this plan will frequently be found useful, serving to sustain the vessels, and support the parts *after* puncture and incision.

The use of this remedy, however, will demand some caution; for if the bandage be too tightly applied, it may cause the mortification of the part. We should always apply it loosely at first.

Again, among topical applications there are several, to which much importance has been attached. Among them, I would mention the ordinary grey mercurial ointment. This has been highly recommended by Dean and Little, was at first much employed, and is now also much used by some surgeons. It is however, a very uncertain remedy: so much indeed is this the case, that some have regarded the lead that enters into its composition as the active principle; and hence olive oil, hogs lard, &c., have been employed. This, however, I think, is a mistake, as the mercury may stimulate the vessels, and, under some circumstances, prove advantageous. Here I would also mention, that a variety of *saline solutions* are also used. Some use corrosive sublimate, and some a solution of calomel; but the wash which I regard as the very best, is that recommended by Velpeau. It is a strong solution of the sulphate of iron—a half ounce or ounce to the pint of water; but if there is any abrasion of the skin, a solution of this strength may not be borne, and a weaker one must be used. This application may so stimulate the parts, in some cases, as to give rise to a salutary result.

There is yet another powerful topical application which I shall only mention. It is the actual cautery: and it may be used in two ways. First, it may be applied directly to the part, acting as a blister: and in the second place, a common cauterizing iron, brought to a white heat, may be passed over the part several times, *not in actual contact*, but acting as a stimulant, by the radiation of the heat from the iron.

But to pass on to the *constitutional treatment*. You will remember, that I divided this disease into *sthenic* and *asthenic*. Concerning the antiphlogistic treatment I have already spoken, particularly while speaking of erysipelas *vera;* it will also be applicable in the sthenic division of erysipelas-psuedo. But where the disease is of a decided asthenic character, it would be a highly improper, nay, it would be a fatal course to pursue. We should here give tonics—as bark or quinine—and opium to secure rest; and we should impart life to the patient by a good diet, or a full allowance of wine, or even of brandy, as in cases of malignant ataxic typhus. The secretions must also be attended to; and they should be kept active, in all of these diseases, in order that the poison undermining the constitution, may be thrown out of the system. Some, indeed, rely entirely upon this treatment. And it is worthy of remark, that, while in the country, cases of this disease are generally of the sthenic type; yet as they appear in cities, they are nearly always of an asthenic character. The consequence of this is that physicians in large cities agree, that the stimulating treatment alone succeeds. Some rely on a kind of *wait* and *watch* treatment; and in some cases that are confined to the skin, and are of a metastatic character, this mild expectant treatment, I am inclined to think, is the best. Time, good nursing and *pure air*, will do more here than anything else; so that where the disease prevails epidemically, or endemically if you choose, it is a matter of great importance to remove the patient out of the infected atmosphere.

Another form of unhealthy inflammation, depending on a prostrate state of the constitution, is a disease known as *Anthrax* or *Carbuncle*. This affection at first presents a circumscribed swelling, similar to that accompanying a common boil.

The skin, however, soon becomes dark, and the cellular tissue indurated; two, three, or more, vesicles appear about the summit of the swelling, and a peculiar burning sensation is experienced in the part, giving to the disease its peculiar name, *anthrax*. The disease is nearly always engrafted on some constitutional derangement: and once the local affection has made its appearance, though of small extent at first, it may go on gradually extending, until a large surface is involved. When the vesicles break, we find a number of grey points exposed; and when the epidermis separates, the skin appears completely riddled, presenting a honey-comb appearance.

The grey spots are found to consist of lymph, deposited in concentric layers. At this stage, the carbuncle will give to the hand of the examiner a doughy feel: as sloughing goes on, it becomes softer; and, if the disease is allowed to progress, other changes soon manifest themselves, by which it may be easily recognized. The skin gives way, and a fluid is often discharged; but this is not of a purulent nature; in fact, there is no suppuration, though the disease is essentially a process of local death. The affection gradually extends impressing the constitution in a very unfavorable manner; and if the result is unfortunate, the patient is destroyed by *debility*.

The causes of this disease are not easily understood: at particular periods it is found to prevail; and certain localities appear to favor its development. In England, it is found by statistical reports, to be now on the increase, and the same is also true in this country.

The *treatment* is general and local.

Of the general treatment, I need not say much. It should always be of an invigorating character. Good animal diet, opium to allay pain and give rest, must be resorted to; and the secretions must be regulated. The local treatment is by far the most important; and here we have two leading remedies, the knife and caustic; the first being most frequently employed. Free incisions should be made, extending to the bottom of the carbuncle. If the disease is of limited extent, a crucial incision will be found sufficient; but if the swelling is large, a sufficient number of cuts must be made to relieve the constriction and to promote sloughing. This plan will arrest the disease; and, when the dead parts are thrown off, a free granulating surface will be perceived at the bottom of the cavity. If we determine to resort to the caustic, having guarded the neighboring parts with adhesive plaster, we should rub the potassa fusa over the centre of the tumor until an escar of sufficient depth is formed. If any of the caustic should by accident be diffused over surrounding parts, it may be neutralized by acetic acid.

If after the sloughs have become detached, the granulations under them spring up and assume an unhealthy character, it may be necessary to use stimulating applications, as in treating an indolent ulcer.

I would state in reference to this disease, that where, after opening by caustic, it still continues to extend, I have frequently found useful results to follow the application of a blister to the surrounding parts. It seems to prevent the extension of the affection, to promote healthy action, and to stop the destructive process.

ESSAY No. 2.

SYPHILIS.

Primary Syphilis—Cause—Symptoms—Treatment—Consecutive Primary Syphilis—Secondary Syphilis—Symptoms—As effecting Skin, Mucous Membrane, Bones, Organs—Infants—Treatment of Secondary Syphilis.

In Syphilis we have a good example of a strictly contagious affection, local in its origin, but capable of propagating itself so as to affect the whole constitution. It was considered by Hunter and others to be identical with gonorrhœa; but this opinion is now deservedly rejected by almost all writers on the subject. The experiments and investigations of Ricord have conclusively proved, that they are two distinct and specific affections. They individually reproduce themselves; but neither ever gives rise to the other, as this author has satisfactorily shown in the results of his experiments by inoculation. The pus from a chancre, when inserted into the skin or mucous membrane, always gave rise to a sore of the same kind, and never produced gonorrhœa; nor did the discharge from the latter ever give rise to a chancre.

The history of the disease cannot be satisfactorily made out; though a good deal has been written on the subject. Some have attributed its origin to our country; whence, they say, it was introduced into *civilized society* in Europe some time in the latter end of the fifteenth century.

The disease is always contracted by the contact of the peculiar virus with some mucous surface, or some delicate or abraded portion of the skin. The contagion is generally communicated in the act of coition, and therefore the organs of generation are most apt to be primarily affected. It is sometimes received on the buttocks or thighs, however; and sometimes on the lips from kissing, or from suckling, on the nipples from nursing a child infected with the poison, and even on the fingers of the practitioner. Syphilis is divided by some authors into three forms, the *primary*, the *secondary*, and the *tertiary;* while by others it is considered under the two heads of *primary* and *secondary*, or *local syphilis*, and *constitutional syphilis*. We prefer, and shall therefore adopt, the latter method of discussing the subject.

Primary Syphilis.

Primary or *Local* Syphilis is confined to the spot first affected by the contact of the poison, or to its immediate neighborhood. It is known to exist by the presence of sores presenting certain peculiarities of form and appearance. These primary syphilitic ulcers are called *chancres.* They always originate from contagion, and are capable in turn of infecting others or other parts of the same person; as well as of inducing what we shall hereafter describe as *secondary* or *constitutional syphilis.* They are *specific ulcers;* and, like other ulcers, are to be studied under two distinct periods: in one the sores are progressing or stationary; in the other they are under the healing process of granulation and repair. When they commence the latter process they lose their specific character in so far as the loss of the power of reproducing themselves by inoculation is concerned; though the former period, during which they do possess this power, may be prolonged indefinitely. As already mentioned they are almost always contracted on or about the privates, from an impure sexual connection. They may usually be observed from the second to the sixth day after the connection; though sometimes their appearance is unaccountably delayed; and sometimes—though *very rarely*—they appear within twenty-four hours. An itching, smarting sensation usually directs attention to the part, and a little inflamed spot is observed. This rises into a little vesicle, which is filled with fluid, soon bursts, and leaves a slight excoriation. This increases to a small ulcer; which enlarges with more or less rapidity, while its edges become everted, and surrounded with inflammation. In other cases it commences with the appearance of a hard, painful lump, which soon bursts and leaves an ulcer; or, in others again, a small pustule is the first evidence of the infection. Sometimes, and perhaps most frequently, nothing is noticed till the ulcer has already formed. These syphilitic ulcers or chancres present so many different appearances in their progress, that they have been divided by surgical authors into several varieties. In their early stages they are generally alike: their after divergence is probably dependent on the constitutional peculiarities of the individual, and on the situation of the sores; as also, according to some, on the constitution of the person from whom the disease has been caught. "If it is the glans that is inflamed, generally a small pimple appears full of matter, without much hardness, or seeming inflammation, and with very little tumefaction, the glans not being so readily tumefied from inflam-

This species of chancre is said mostly to resemble those produced by inoculation, and therefore is regarded by some as the "typical form of chancre." The characteristic induration seems to be caused by the effusion of a peculiar plastic material, which, in its microscopic appearances and chemical properties, resembles healthy lymph, but "differs from it in its vital characters; just as the pus of a chancre may differ, in this respect, from that which is secreted by a healthy ulcer. The great peculiarity of the plastic base of the Hunterian chancre is evidently that it in some way serves as a source for the continued production of the virus and the consequent impregnation of the system with it."* This chancre may be found on any part of the penis, but is generally situated on the glans: its surface is covered with a tenacious, dirty white, or gray slough: and it is higher than the surface of the part, and of a circular shape.

The *phagedenic or eroding chancre* is accompanied, as the name implies, by a continuous disintegration of parts. A chancre may assume this form in the course of its progress, or it may be phagedenic from the beginning. It most frequently commences in the neighborhood of the frænum; it progresses sometimes slowly, and sometimes with fearful rapidity, and the loss of structure is generally very considerable, not unfrequently the whole organ being destroyed. No granulations are to be observed; no attempt at reparation is made; the edges of the sore are sharp, and sometimes over-lapping the ulcer; the discharge is ichorous and offensive; and the surface and edges of the sore are sometimes covered with a white, or, in other cases, a black slough. These latter features have afforded to some the grounds for a division of this form of chancre into three varieties, that without slough, that with a white slough, and that with a black slough. Mr. Wallace is the author of this division, and he is followed in this respect by Erichsen. Their essential, erosive character is much the same, however, and they all are equally liable to take on an increase of inflammatory action, and to become more rapidly destructive. According to Erichsen, the variety with the black slough differs from that with the white slough in "its tendency to induration, and to somewhat rapid extension." All phagedenic chancres are very apt to be accompanied with a good deal of pain, and generally give rise to considerable constitutional irritation.

The *sloughing* or *gangrenous chancre* is somewhat similar to some varieties of the preceding, but is to be distinguished by its more *gangrenous* character. The parts lose their vitality, not by particles, but *en masse.* A certain portion seems *poisoned* and *killed,* but not eaten away by atoms or by thin layers, as in the sloughing variety of the phagedenic form; and the parts around are highly inflamed, very much swollen and very painful. This chancre usually commences on the prepuce or glans. A spot of gangrene appears, which spreads rapidly, sloughs off, and leaves an ulcer; over whose surface a new slough is soon formed, black, soft and pulpy. The sore rapidly destroys all around; the prepuce is sometimes wholly removed; and the glans is more or less exposed. The corpora covernosa may even be laid bare, and the gangrene may extend in a greater or less degree, into all the structures of the part. Sometimes the dorsal artery is divided, and a considerable hemorrhage results.

---

* Erichsen, p. 410, Am. ed.

Chancres in general may also be divided into *external* and *internal chancres.*

External chancres, in the male, are most frequently situated about the prepuce, next about the frænum, next on the corona glandis and the gland, and then on the skin of the penis and at the urethral orifice; while those affecting the female organs are most frequently found on the internal surfaces and folds of the labia and the fourchette, very seldom on the vaginal surface.

Internal chancres, in the *male,* are found within the urethral orifice, usually just inside; and they may be generally detected by slightly opening the same. Sometimes they are further in, and, according to Ricord, they may sometimes be found even as far as the bladder. The internal chancre, in the *female,* is found at the mouth, or on the neck of the womb; and the speculum will have to be used to detect their presence.

The *diagnosis of chancre* is sometimes quite easy, but at other times quite difficult, unless we resort to the (in some respects) infallible test that Ricord has proposed; viz: that of inoculation. The peculiar characteristics presented by the various forms which we have described, are often so well marked as to satisfy us of the nature of the case, and if the sore has appeared a few days after connection with a woman of unreliable character, there can be but little doubt on the subject. Even here, however, we must be careful; for there are some men who almost always experience slight excoriations after coition, and these may be mistaken for a commencing chancre. We must also be careful not to mistake the *aphthous affections* of these parts, or the healing surface left by a *ruptured frænum*, for a chancrous sore. If the inguinal glands are not enlarged and the sore does not present any of the characteristics of the chancre, and if it has occurred, to the knowledge of the patient, from a ruptured frænum during coition, its nonspecific character will be apparent. All *doubtful* cases it will be best to treat as true chancres. The test of inoculation is liable to several objections. In the first place it takes too much time, (from two to four days) to decide the question, and in the meanwhile we cannot let the case remain untreated; in the second place, the sore produced by inoculation proves sometimes more difficult of cure than the original one; and, in the third place, it will fail to give us any light on the subject, if the original chancre has got into the second period of its progress, for, as already stated, its pus is then incapable of reproducing the specific sore. This will also be the case in all *secondary sores*, at any stage of their progress.

The diagnosis of internal chancre is often still more difficult, and sometimes merely conjectural. In the male urethra, where the chancre is too far in to be seen, its presence may sometimes be inferred from the character of the discharge, which is scanty, ropy, dark, and sometimes tinged with blood. Internal chancre in the female can be detected by the use of the speculum, and in no other way.

Sometimes when phymosis is present, even the external chancre cannot be seen, if it is situated on the glans, or on the internal surface of the prepuce, unless the latter be slit up in the course of the treatment.

The Treatment of Primary or Local Syphilis, will now engage our attention. Although the affection is of a strictly local character, its constitutional tendencies render it necessary to adopt a general, as well as a local system of treatment. The main indication in both is, the prevention of the constitutional infection which threatens; and the most important consideration, in carrying out this indication, consists in an early destruction of the specific character of the local affection. If this can be done before the constitution has absorbed the poison, the main indication is fulfilled. But it cannot be positively known at what precise period the absorption may begin. Ricord has expressed the opinion that it does not occur before the fifth day; and most authorities consider that this is probably the truth. But it is nevertheless prudent to adopt a constitutional treatment in conjunction with the local from the first; and it often happens that we do not see the case before the time he mentions has already passed.

The *local treatment* of primary syphilis, as already stated, consists in the destruction of the specific character of the sore, and the production of a healthy granulating surface. This is accomplished by the early application of some effectual caustic. If the local inflammation is very great, however, we must first use soothing and cooling applications, to reduce this excitement. Some lead lotion or other cooling wash must be used; and after the excitement is somewhat reduced, the caustic should be thoroughly applied. Nitrate of silver, caustic potash, strong solutions of corrosive sublimate, mercury dissolved in nitric acid, pure nitric acid, and other caustics, have all their particular advocates, the nitrate of silver being the one which is most frequently used. The first application should be thorough, in order to change entirely the character of the sore; and the strong nitric acid is preferred by some, because it is more efficacious in accomplishing this object. They assert that it is more energetic, and yet not more painful; and this is probably true. The part is to be mopped with the acid, washed with cold water, and covered with a poultice. The solution of mercury in nitric acid is equally efficient, and it is preferred by some. The resulting ulcer should be treated according to the appearance it presents, just as we would treat other ulcers. Some advise that it should be frequently washed with a weak solution of corrosive sublimate, or dressed with citrine ointment, or black wash. Sometimes, after the caustic has been thoroughly applied, and the slough produced by it has separated, the ulcer beneath will present such a healthy granulating surface, that simple dressing alone will be needed; but most frequently it will require some medication before it takes on a healthy action.

If there is a fungous appearance about the granulations, they must be occasionally touched with the luner caustic; and if the ulcer has a weak, flabby look, it may be well to use some astringent lotion. The following recipe from Erichsen, will answer the purpose about as well as most others of the same sort—

℞.	Tannin	℈i.
	Tinc. lavendulæ comp.	℥ii.
	Vini. rubri	ʒiv.
	Ft. lotio.	ʒii.

If the sore is very irritable, some opiate lotion should be used;

and if there is much sloughing, or if the discharge is offensive, some antiseptic, such as the solution of the chloride of sodium, should be also employed, in conjunction with emollient applications, till the irritability and inflammation are sufficiently reduced; when, if the sore still retains its specific character, the active caustic should be thoroughly applied to its surface. When the tendency to mortification or rapid phagedena is present, nitric acid should be freely applied, as for sloughing ulcers, and followed by soothing poultices and opiates. Should there be so much phymosis as to prevent the application of these measures to the chancre, this condition must be removed by slitting up the prepuce; when no time must be lost in touching the sore with the caustic, in order to destroy the power it may possess of infecting the newly cut surfaces, and thus extending the chancrous disease; and if this plan fails to prevent the contagion, the wound should also be freely cauterized.

Care should be taken in all cases to prevent the friction of the two folds of mucous membrane against each other. Little pieces of lint, anointed with simple cerate, or soaked in the wash which is being used, should be inserted under the prepuce in males, or between the labia in females.

We now come to the *constitutional treatment* of primary syphilis; and here we find one remedy, mercury, which, from its peculiar efficacy, claims the reputation of a specific in the disease, both in its primary and secondary developments. Like every very efficient agent in the list of the materia medica, this remedy has been first over estimated, then under estimated and neglected, and then viewed in its approximately true bearing. The exaggerated powers once popularly ascribed to it caused it to be indiscriminately used, and therefore, abused. The evil resulting from this abuse then caused it to be under estimated and neglected; and the investigations and careful researches of modern science have at last begun to estimate, with more or less approximation to truth, its real powers. That it is the most efficient medicine that we possess for the treatment of syphilis, few educated surgeons will now doubt. Its use in *primary* syphilis is as a preventive, as well as a curative agent. It will not do to use it indiscriminately, for in some cases it certainly does no good, and may do, as it undoubtedly has done, considerable injury. The circumstances which prohibit its use are referrible to two heads: those of a *local,* and those of a *general* character. If the chancre be of a phagedenic or a sloughing or gangrenous character, its employment is stated by the best authorities to be inadvisable while these conditions obtain; and it is said not only to fail in being of service to such cases, but often to be positively injurious. When the chancre is of the indurated character, (either if it is so from the beginning, or if it at any time assumes that character,) the adoption of a carefully conducted course of mercury is peculiarly appropriate, this state of induration being regarded by most authorities as premonitory of the general infection, and by some as the first symptom of actual constitutional disease. This question of the utility of mercury in primary syphilis, has been a cause of much contention. The best and latest authorities incline to its moderate and careful employment. Erichsen says that, "as it is impossible to say when the absorption of the poison into the system takes place, though it is probable, as Ricord supposes, that it does not occur before the fifth day, constitutional treatment should be had recourse to from the very commencement of the disease." The constitutional treatment which he advocates is the mercurial one, ***judiciously*** administered, and ***not indiscriminately***, as see what he says further on: "I am quite ready to allow that there are certain forms of primary sore, especially those of a phagedenic or sloughing kind, in which the simple treatment alone is admissible, the state of the constitution or the disease being such, that mercury cannot be given in any form."

Green says: "In general the action of mercury should be kept up three weeks for a chancre, * * * * * * and if the symptoms should disappear quickly, still it will be right that the remedy should be continued, for the mercury is not given to cure the local symptoms only, but to ensure the system against their recurrence, and to destroy the disposition to disease in those parts which have been contaminated by the poison."* He thus agrees with Erichsen, and also with Laurence, in the belief that mercury, in this stage of syphilis, whenever it can be judiciously administered, possesses a protective power. The latter says, "It is my plan in private practice, to employ mercury moderately—not extensively but moderately—in the treatment of primary syphilitic sores (except in the cases of sloughing and phagedenic sores,) and certainly I have been in the habit of seeing secondary symptoms very seldom occurring in such cases." † Chelius advises, in a general way, that "the milder preparations of mercury, the *mercurius solubilis* of Hahnemann, or calomel at a quarter or half a grain, and in increasing doses according to circumstances," should be given. Hunter in certain kinds of chancres, which he called the only true ones, always gave mercury, and even regarded the curability of a chancre without this medicine as a proof of its non-specific character, as did Abernathy also. Ricord, whenever he is dealing with a specific chancre, resorts to a mercurial cause. He believes that such a course may prevent the constitutional developments for a very indefinite time, sometimes for many years; though he does not believe that mercury possesses the power of destroying the diathesis which he believes is invariably induced; and in this latter position he is supported by Erasmus Wilson in his late work on syphilis. The latter contends that no constitutional treatment is necessary, provided his favorite caustic—the potassa fusa—has been properly applied; and there are still some who contend that there are other modes of treatment, both for primary and secondary syphilis, which are preferable to that by mercury. Others, again, advocate the use of mercury in constitutional syphilis, while they deny the necessity for its administration in the primary or local form of the disease. Most of this class, however, regard the induration of the chancre as a symptom of constitutional affection, and therefore use mercury in cases where the local appearances are their only guide; thus *practically* agreeing, in great measure, with those who recommend a mercurial course in certain cases which they call *primary*. M. Vidal, for example, says "When the chancre is obstinate, when, from being moderately it becomes much indurated and seems to constitute a separate variety, I believe that the syphilitic virus has then for some time already infected the system."* We think, upon a careful review of the authorities, that we may consider the following conclusions and rules, in reference to the constitutional treatment of primary syphilis, as those most generally held and followed by the profession.

---

* See Chelius' system of Surgery, by South, vol. ii. p. 88.

† See Chelius' system of Surgery, by South, vol. ii. p. 86.

First.—Mercury, carefully administered and continued for an appropriate period, is the most useful agent in preventing constitutional infection, as well as in curing obstinate local ulcerations.

Secondly.—The mercurial course does absolute injury when the constitution is enfeebled, irritable, or of a cachectic habit; tending in such cases still further to reduce the system; and thereby facilitating the progress of the disease.

---

*See New Orleans Med. and Surgical Journal, vol. xi. No. 2, page 271.

Thirdly.—This course is also inadmissible in all cases of sloughing or phagedenic chancre, or when there is much local inflammation or irritation, as liable to increase the evil, as well as being in the former instances perfectly useless; since in those cases there is no danger of constitutional infection while the sloughing, or phagedenic process is going on.

Fourthly.—Where the mercurial or specific course of treatment is prohibited, the patient should be treated by such general principles as the particular cases will indicate.

Fifthly.—Appropriate regulations as regards diet, drinks, adjuvant treatment, &c., should be followed.

A few remarks to explain the application of these rules will be appropriate. In the first place, what are the preferable modes of administering mercury in such cases, and how long should its use be continued? It may be given by mouth, or by inunction; and in its internal administration in this form of syphilis, the milder preparations are generally to be preferred. From two to four grains of blue pill two or three times a day are prescribed by many; by others quarter grain to half grain doses of calomel are employed. Erichsen prefers, "when it is desirable to produce but a moderate effect upon the system," the iodide (the proto-iodide it is presumed) in one grain doses three times a day, "or the Plummer's pill in five grain doses twice or three times a day, * * * * * when the constitution is somewhat irritable." In some not very robust constitutions it will be advisable to give the iodide in some tonic or alterative preparation, such as any of the *pure* preparations of sarsaparilla, or the comp. tinc. of cinchona. Whatever mercurial is used, may often be advantageously combined with an opiate, especially where it tends to irritate and purge; and its combination with red pepper is said to be advantageous in preventing the intestinal pains it occasionally produces.

The method of inunction with mercurial ointment is to be preferred in those cases of irritability of the stomach and bowels which the opiate combination fails to relieve, or where some peculiar intolerance of the medicine is found to exist. About a drachm of the ointment should be well rubbed into both thighs, or into the axillary regions, night and morning, carefully watching the effect, and bearing in mind that it is never desirable to produce an acute salivation in these cases.

When we come to answer the question, as to how long the mercurial treatment should be continued, we find it difficult to give a definite reply. One authority, Green, says, as already quoted, that for a chancre "in general the action of mercury should be kept up three weeks." Chelius says: "If the ulcer heal with this local and general treatment, the internal use of the mercury must not at once be given up, but should be continued in smaller doses for some time." Laurence states that general experience "has led to a belief that perseverance in the use of mercury for some time, say about ten days or a fortnight after cicatrization, has a beneficial effect in protecting the constitution." Ricord considers that the best plan is to adopt a "six month's treatment at a daily dose which has a marked effect upon the symptoms that we have to combat, and which effect, we are convinced, still continues after their disappearance." His mercurial treatment, however, it must be remembered, is restricted to the cases of *indurated* chancre alone. Erichsen on the contrary says: "The duration of the mercurial course must depend upon the effect produced upon the sore; it need not be continued until this has cicatrized, but it should be persevered in until all specific action in it has ceased, and it has got a healthy and healing state. * * * * * The effect produced upon the sore, rather than that upon the gums, should be our guide as to the proper time for discontinuing the mercurial." With the authorities thus arrayed the reader may judge for himself. We agree most decidedly with the latter writer, notwithstanding the minority in which we find him; and would only add to what he says that each case will present certain other criteria also, by which we should be assisted in determining the limits of the mercurial course. The constitution of the patient, the manner in which he bears the treatment, the condition of the inguinal glands, or the presence of *any* consecutive symptoms, the length of time between the appearance of the chancre and the commencement of the treatment, the degree of obstinacy of the ulcer, and the amount of induration which has characterized its progress, should all be carefully considered. The surgeon should form his decision in this respect according to his own judgment in each particular case.

The *second* rule is one of no little importance. The injury done by the administration of mercury for chancres to persons of weak, irritable, and cachectic constitutions, was the main cause of the opposition which at one time raged against the use of the remedy. It may almost always be employed without injury in persons of ordinary health; but its constitutional effect in all cachectis habits of body, in all cases where the vital forces are weakened by excesses of any kind, in short, whenever the system is much "below par," or where it is in an excitable, feverish condition, must always be injurious. Occasionally some of these objections are but temporary, and susceptible of removal by proper treatment; and in such cases the mercury may be used with advantage, after this preparative system of treatment has been successfully pursued.

In reference to the *third* rule, the same general principles must be borne in mind. According to those who have enjoyed the best advantages for observation, chancres of the sloughing or phagedenic kind are seldom followed by constitutional symptoms. The administration of mercury, therefore—at least while these conditions obtain—is worse than useless; though it is right to add, that there are some who deny this fact. Any excess of local inflammation, or a great deal of local irritability, is also regarded by the best authorities as contra-indicating the mercurial course.

And this brings us to the *fourth* rule. The mercurial treatment is *the* treatment for specific chancre; but when circumstances prohibit its adoption, we must fall back upon such measures as the general principles of the medico-surgical art will sanction. If inflammatory symptoms run high, they must be subdued; if the opposite condition of depression, or anæmia, is present, the health of the system must be improved; any depraved condition, or diathesis, must, if possible, be rectified; and antiphlogistics, tonics, and alteratives, will soon be needed, according to the indications afforded by each case. Under the latter head may be included what is called the *simple* or *non-mercurial method* of treating syphilis, secondary as well as primary, which has been exclusively adopted by some. The various vegetable "alteratives," so called; the preparations of iodine and potash, gold, silver, steel, antimony, &c., have been all used with more or less benefit, in both *local* and *constitutional* syphilis.

Fifthly, the *diet*, *hygienic regulations*, and *adjuvant measures*, when judiciously directed, materially assist in the treatment. The diet should be plain, unstimulating, moderate; and no acid drink, or heating food is to be permitted. The amount, and exact character of the diet, however, should be somewhat modified to suit each case. The patient should avoid all violent exertion, and should be, if possible, confined to his room, or even his bed; he should avoid all excitement, and his clothing should be warm and *clean;* the pores of the skin should be kept unclogged, and a warm bath occasionally will best secure this condition, as well as be of service otherwise. These are adjuvant measures, as well as hygienic; but there are others more especially medical. The bowels should be kept in a healthy state, and a free purge should always be administered immediately before the commencement of the mercurial course. The combination of opium or capsicum with the mercury, in certain cases where the latter is not well borne without them, has been already alluded to. Various decoctions and diaphoretics have been recommended, and are probably of some benefit. Some of the vegetable alteratives may be used, as the preparations of sarsaparilla, queen's delight, &c. Here, also, each case will require particular measures, which must be left to the judgment of the surgeon; and the same case will often require a change of medicines, as the symptoms themselves change.

We will now say a few words concerning the *prophylactic treatment for chancre.* When there has been, or there is likely to be, an exposure to the cause, how may its action be prevented? The question presents two aspects: what may be done before the exposure, and what after? The insiduous manner in which this vile disease may sometimes ingraft itself upon its unsuspecting victim, should teach great caution to those in large cities, crowded hotels, steamboats, &c. Indulgence in indiscriminate sexual intercourse not being the only medium of infection, even the most virtuous are not entirely exempt from danger; though of course their risk is infinitely less than that incurred by the profligate and careless. According to the experience of Ricord, the disease may be communicated, among other means, by the medium of water-closets, tobacco-pipes, drinking cups and glasses, spoons, by the lancets of scarificators, by leeches, and not unfrequently, in the case of infants, by the Parisian wet nurses, from chancre on the nipple. Wiping on a common towel, or even washing in a common wash-bowl, handling a contaminated bank bill with a cut-finger, "the putting of coins in the mouth; omnibus tickets in the lips;"* kissing the lips of one afflicted with a chancre thereon, or even in the mouth, may be sufficient to spread the poison. In cases when *intentional* danger is to be incurred, or where one suffering from a chancre intends to cohabit, and yet wishes to avoid giving the disease, as in the case of a man with his wife, the prepared cœcum of the sheep is quite an effectual protection from contraction of the disease on the one hand, or communicating it on the other. Such are the considerations to be borne in mind *previous* to the actual contact of the virus. There are still certain measures which may prove effectual after the actual contact. Wilson affirms that simply washing the genitals after coition with soap and water, and in females, the after injection of vinegar and water, will always prevent the contagion, at least in males. Others have recommended the washing of the parts with alcohol, with solutions of the sulphates of zinc or copper, or with alkaline or acid solutions. The following was communicated to the Academy at Paris by Dr. Langebert in 1851, with the belief that it possessed a specific anti-contagious power: "℞. Alcohol, two parts; soft soap of potassa, with excess of base, two parts; dissolve and filter, then add essential oil of citron, one part. Apply for two minutes to genitals and then wash with fresh water."* Dr. Rode, in a report to the "Administrations of Hospitals" at Lyons, recommends a liquid composed of four grammes each of perchloride of iron, citric acid, and hydrochloric acid, to thirty-two grammes of distilled water. This is intended for application when the fact of infection is known, and it is simply dropped on the spot or applied with lint or charpie. "The prevention of contagion will be complete if the lint or charpie is applied for an hour. Even a shorter time will probably suffice, but no inconvenience will be experienced if it is allowed to remain twenty-four hours."† It is stated to produce a slight "blotch," which soon disappears.

---

* New Orleans Medical and Surgical Journal, vol. xi. No. 2, p. 265.

It is likely that any of these plans, *carefully pursued*, will, in most cases, prove effectual: the difficulty generally consists in the ignorance of the fact of the contagion.

Consecutive Syphilis.

Before we pass on to the consideration of secondary, or strictly constitutional syphilis, there is a certain set of symptoms, classed by some with secondary syphilis, which requires notice. These phenomena are *strictly local*, but are not situated in all cases at the point of *primary* infection; the *indurated scar* of course is; the *wart* may be; but the *bubo* is some little distance from, though in direct communication with this point.

The *indurated cicatrix* is regarded by some high authorities as an effect, and an evidence, of constitutional infection. Erasmus

---

* New Orleans Medical and Surgical Journal, vol. viii. No. 9.

† New Orleans Medical and Surgical Journal, vol. xii. No. 1.

Wilson, in his work on syphilis, asserts this as his belief. It is difficult to conceive what satisfactory proof there can be to support such an hypothesis, when the local phenomena are very frequently neither accompanied, nor preceded by any constitutional symptoms whatever. But, however that may be, it is certainly a well established fact, that this induration, either of the chancre or of the cicatrix, is *invariably premonitory* of constitutional symptoms. The poison seems to be still lingering in the spot; and it is perhaps there reproducing its virus. The *indurations* are especially apt to follow such chancres as have not been deprived of their specific character, not unfrequently these chancre having been so slight as to be unheeded by the patient; who will often declare, and without intending to deceive, that he has never had a chancre in his life. The cicatrix thickens and hardens; its vitality seems to sicken, as it were; and it is easily destroyed, as may be seen by the great tendency it exhibits to fall into a state of ulceration of an unhealthy, sloughing character. Frequently the induration does not present itself for weeks, and sometimes even months, after the chancre has seemed to heal; and generally it is accompanied with no pain or inconvenience whatever.

What we have already said in relation to the treatment of indurated chancre will also apply to the management of this subsequent indication, so far as its *constitutional* treatment is concerned. In the *local treatment* we must avoid the use of caustics, as they are apt to reproduce the ulcers, and employ some of the mercurial applications. The washes are to be preferred; and of these, that of calomel and lime-water—two drachms of the former to a pint of the latter—called the "black-wash," is the best. A piece of lint soaked in it should be kept applied to the spot.

Syphilitic Verrucæ or Warts occasionally present themselves in the course of, or after an attack of primary disease, and without constitutional symptoms. They are of various kinds. Sometimes they are merely the result of local irritation, without possessing any truly specific character; while in other cases they are genuine syphilitic affections, and capable of communicating the specific poison. They should always be treated with suspicious care when preceded by a chancre. Those of a more contagious character are usually dry, and seldom attain any considerable size; while those which are specific and contagious are moist, vascular, and sometimes very large, numerous, and growing in bunches like certain kinds of flowers.

They most frequently spring from "the prepuce or glans, and are especially apt to be situated in the angle between these parts;"* and they sometimes are found to have perforated the prepuce by means of the absorption which is caused by their pressure against its under surface. Their presence obstructs the retraction of the prepuce; and, therefore, this is generally in a state of phymosis.

These growths may be removed by caustic, or by excision. When the latter practice has been adopted, the spot from which they arose should be touched with caustic; and to get at this spot it will sometimes be necessary to perform the operation for phymosis.

Buboes accompanying or succeeding primary syphilis are, like warts, of two kinds—simple or nonspecific, and syphilitic or specific. As an ulcer or wound on the lower extremity may produce an enlargement of the inguinal glands, so may any irritation of the penis—a chancre, an attack of gonorrhœa, or any other lesion. Nothing is more common, especially among our negro patients, than for them to tell us, when they are suffering from some painful disease or injury on the lower limb, that they have "a kernel in their groin, it hurts them so." So the irritation and pain from a chancre may also produce a simple "kernel in the groin;" and this may even go on to suppuration without possessing any specific character. But in other cases, and sometimes in the same cases and at the same time, another process may be going on; the virus itself has reached the gland, and is giving rise there to its specific train of action. Thus we may have a simple glandular abscess and a syphilitic bubo at the same time. The two causes may act concurrently, and may even concentrate their energies on the same gland; though, according to Ricord, when the specific bubo results from a chancre of the genital organs it "affects only the *superficial ganglions*, and most commonly only one at a time, although more glanglions, either superficial or deep, may be inflamed or swollen at the same time; so that one glanglion actually presents all the characters of a virulent bubo, whilst the neighboring ones, in which the inflammation has reached to suppuration, as well as the surrounding cellular tissue, present simple and not virulent characters." It is often impossible positively to diagnose a specific bubo without resorting to the test of inoculation; and of course we cannot even avail ourselves of this test, till the latter stages of the affection. We have now to do with bubo only as *consecutive to primary syphilis.* Some French authors speak of a species which presents itself, they affirm, as a *primary symptom,* calling it a "*bubo d'embleé*" It is probable that in such cases a chancre has preceded the bubo, but has been unobserved, either because it was small and quickly healed, or because it was an *internal* chancre or a "*chancre larvé.*" Ricord acknowledges that sometimes, from the absence of any suspicious antecedent or concomitant, "we are forced to admit a primary bubo;" but he also affirms that he never has found the pus from such a bubo to be contagious, and remarks that it would "be absurd to conclude that a bubo is necessarily syphilitic because it had appeared a short time after connection," since other causes besides that of syphilis may produce enlargements of the lymphatics, which causes may often escape our detection.

---

*Erichsen.

The bubo in general makes its appearance before the chancre has yet healed; and it is frequently found to be present, as an indolent glandular enlargement, from the first day or two after the chancre has appeared. It may exist for some time without producing any uneasiness, and may sometimes gradually disappear without further enlargement: in other cases, there is a feeling of stiffness and dull pain in the groin, which is soon followed by the usual symptoms of suppurative inflammation of a severely painful character. In some cases the formation of an abscess may be arrested; but if the pain is very violent and throbbing, the surface over the gland inflamed, and the constitutional symptoms of an irritable or highly febrile character, suppuration will certainly take place. When the abscess has been opened, or has itself ruptured the skin, an unhealthy, ragged ulcer presents itself, with indurated edges and often an inflamed surface. Sometimes the pus is found to have burrowed considerably into the surrounding cellular tissue, and produced a sloughy, unhealthy condition of the same. Sometimes the bubonic ulcer presents a tendency to spread at one side while it heals at the other; and such cases have therefore been called *creeping* buboes: sometimes the sore may assume a gangrenous character, especially in certain constitutions, or when there is an epidemic gangrenous tendency about; and in some cases the deeper glands will sprout up from the bottom of the ulcer, enlarged, and in a state of gangrene.

The *constitutional treatment af bubo* should be regulated upon the principles already laid down for the constitutional treatment of primary syphilis. The *local treatment* will consist, in the first place, in trying to prevent the suppuration, and secondly, when that object cannot be accomplished, in regulating the after processes.

The degree to which the mercurial course is to be pursued must be regulated, as in chancre, by the appearance of the bubo, the constitutional symptoms, &c., &c. If the fever and inflammation run high, means must be taken to subdue them. Nauseants have been recommended in such cases, and there is no doubt that these agents can be so managed as to exert a powerfully sedative influence. The tartar emetic, in small and often repeated doses, is the best of the class. If the sloughing is extensive, and exerts a debilitating and irritative effect on the constitutional powers, they must be supported by appropriate treatment.

If there is much local inflammation and pain, cool, soothing applications should be used, and some, in such cases, recommend the application of leeches, or even general bleeding. If the swelling is of a more cold or chronic character, an attempt may be made to disperse it by applying a small blister over the tumor; and, if this fails to discuss it, it will frequently at least hasten its suppuration. The raw blistered surface is touched by some with a solution of corrosive sublimate, (twenty grains to the ounce of water,) using a feather for the purpose, and repeating the operation in two hours if the first application fails to produce a slough; after which the part is to be covered with a soft poultice. Or the swelling may be painted with iodine, or anointed with some mercurial application: and should it be perceived that suppuration, in spite of our exertions, is about to take place, we may use poultices to encourage it, and open as soon as we can detect the presence of pus. An early opening will frequently save a considerable amount of the surrounding tissues from destruction, and thus tends to limit the size of the resulting ulcer. A recent writer on the subject, *M. Broca, observes two stages of development in buboes: the first is that in which the diseased action is confined to the gland, and the second that in which it is propagated to the surrounding cellular tissue; "and it is by such extension that the ravages of bubo are produced." He consequently advises, that all "local suppurating buboes" should be opened as soon as they are as large as a small hazel nut. It is so difficult always to distinguish between this bubo, at that stage, and the non-suppurating constitutional bubo, that this method will prove impracticable. The best

---

* See Charleston Journal and Review, vol. xii, No. 4, p. 547.

rule to follow is to open as soon as pus can be detected. A free puncture will suffice, if early practiced; but if the tissues are unhealthy, and much burrowing of the pus has resulted, the whole tumor had better be slit open at once. The caustic potash is used by some in preference to the knife, because it destroys these diseased tissues.

The ulcer, which now shows itself, should be treated according to the character it presents. The edges are sometimes undermined and unhealthy, and by their irritation prevent the formation of healthy granulations; in which cases they must be pared off with a knife, or destroyed with caustic or nitric acid. If a sloughing tendency should show itself, this must be stopped by remedies appropriate to such an ulcer; and the thorough application of the nitric acid will sometimes be necessary, as in ordinary sloughing ulcers. This is always an unpleasant feature in the case. South says, "I have known it destroy life by ulcerating the femoral artery and producing fatal bleeding."

When the bubo takes on this character its treatment differs in no respect from that of a sloughing ulcer; it *is in fact* a sloughing ulcer; and for farther particulars the reader must therefore refer to the lecture in which that subject is discussed.

Secondary or Constitutional Syphilitic Infection.

After exhibiting the phenomena we have described under the head of Primary and Consecutive Syphilis, the disease generally becomes for a time lost to our observation. It ceases to present any new symptoms; and we know nothing of its doings, though we can afterwards observe its results. It is not likely that the agent is "lying dormant" as some say; but it is more reasonable to presume, from the train of consequences which ultimately reveal themselves, that the virus is quietly effecting changes, which we fail to detect. These changes we infer from the general results which follow, as well as from the peculiar modifying influences which we see to be exerted over various vital processes, as the healing of accidental injuries &c., these latter phenomena being in some instances the only indications of the constitutional taint. This period of "*incubation*" is of quite an indefinite duration. Sometimes it is over before the primary affection has healed; and sometimes it continues for years after the local symptoms have disappeared: though in these latter cases, we are justified by analogy in presuming, that the poison has not taken all this time to effect its peculiar constitutional changes; but, that, in some more definite, yet unknown period, it has effected these changes, or established its *diathesis;* and that these changes are not manifested in any visible results, that is to say, its diathesis remains latent and, as it were, kept under subjection by the healthy constitutional powers, till some favorable circumstances give the opportunity for its development, or remove the barrier to its action. This explanation seems contrary to Wilson's supposition that the process is one of gradual *poisonous accumulation,* which after a while reaches such an amount as to excite the constitutional powers to an effort for its expulsion: yet on the other hand it seems to agree with his belief in the dependence of the *scrofulous* diathesis on original syphilitic infection, immediate or ancestral. It would seem also, that to establish his theory of progressive accumulation, some approach to a *periodicity of evolution* should be observed, which can hardly be said to be the case. It may be that both of these results are produced; in some cases there may be an accumulation of virus at different times, or an increase in its action, which gives rise to *acute* symptoms; while also a diathesis may be established, at times characterized by some low *chronic* symptoms, and at times latent or subdued, but ever ready at favorable opportunities to exhibit itself in a greater or less degree of activity. But so much has been written on the philosophy of syphilis, that it will be impossible, within our present limits, to do justice to the different views which have been expressed; and the reader must therefore be referred to the writings and researches of Hunter, Carmichael, Bacot, Lawrence,—in his lectures on surgery, in the Lancet for 1829 and '30—Wallace, Colles, Wilson, and others, in the English language; and to those of Swediaur, Devergie, Boyer, Ricord, Turenne, Ritter, Wendt, Hacker, Broeck, Sperino, Gamberini, Gulligo, and others, on the European continent, many of whose works are translated into English or reported in the journals; as well as to our own surgical writers. In the practical consideration of our subject, however, there are some questions which still require notice.

In the first place; what are the *symptoms* of the contitutional infection, or how are we to form our diagnosis?

In the second place; how is it contracted, or what is its *ætiology?*

In the third place; to what results does it tend, or what is its *prognosis?*

In the fourth place; what are the different plans which have been pursued or recommended for its *treatment*, and which are to be preferred?

The Symptoms of Secondary Syphilis.

These are general, and local.

The *general* or *constitutional symptoms* evince themselves in most cases before the local ones. Sometimes they consist in the phenomena usually manifested by a low state of health. A kind of cachexia is established; the complexion becomes muddy; the hair drops out; wounds heal with difficulty, and often assume an unhealthy, *syphilitic* character—which will be described when speaking of the local symptoms; and there is a general impairment of all the powers, physical, vital, and intellectual. In these cases the disease may be considered of a *chronic* character. There are other cases which present more *acute* symptoms. In such the affection shows itself first in a common febrile attack—not, however, of a high inflammatory type, but more like a hectic or irritative fever of more or less tendency to an inflammatory action; and the degree of intensity of this fever seems to bear some proportion to the acuteness and extent of the local results that soon follow.

The *local symptoms* are numerous, and so varied in seat and character as to necessitate their examination in detachment. We will first consider such as manifest themselves on the *skin*; next, such as appear on the *mucous membrane*; next, those presented by the *periosteum and bones*; then, such as the different *organs* may exhibit; and, lastly, those presented by *infants*. The order in which these different classes of symptoms are mentioned is said to be that in which they are most apt to occur; though it must be remembered that more than one of these varieties of syphilitic phenomena may, in many cases, co-exist.

Constitutional syphilis as affecting the skin is a study in itself. The various phenomena may be arranged under the three heads, of *eruptions*, *ulcers* and *growths*.

The various *eruptions* partake pretty much of the characteristics of the ordinary forms of skin diseases, as described by those who have specially directed their attention to this division of pathology. Wilson, in his work on Syphilis, arranges them under three heads; the *first*, syphilitic *Roseola*, or simple cutaneous congestion, he subdivides into *Roseola versicolor*, *R. orbicularis*, *R. annu-*

lata, *R. punctata*, and *R. papulata*, this last being the connecting link between the non-elevated and the elevated forms; of the *second*, syphilitic *Lichen*, he also makes out five varieties—*L. corymbosus*, *L. disseminatus*, *L. confertus*, *L. annulatus*, *L. pustulatus*; and in the *third*, or syphilitic *Tubercle*, he comprises five varieties—*Tubercula corymbosa*, *T. circumscripta*, *T. disseminata*, *T. annulata* and *T. ulcerantia*. This author, it must be remembered, considers scrofula, phthisis, lepra, psoriasis, and lupus as all of syphilitic origin. Lawrence makes four divisions of syphilitic eruptions; *first*, the *scaly eruption* or *syphilitic lepra*, or *psoriasis*; *secondly*, the *tubercular eruption*; *thirdly*, the *papular eruption*; and *fourthly*, the *pustular eruption*. Our present purposes will be very well answered by adopting the arrangement of the latter authority; and we shall take the liberty of quoting his descriptions of them as follows:

"1st. The *scaly* eruption is one of the most common. The skin before the eruption appears exhibits a kind of mottled or marbled appearance all over the body. If you strip the patient, though the skin is seen in the natural state, yet there is a streaked or mottled appearance underneath; there are little patches of red appearing through the cuticle, which give it that appearance. Very soon you observe spots of a reddish brown, or what would be called a coppery color, on the skin; and this has always been the marked character of venereal eruption. These reddish brown superficial discolorations of the skin soon become more deeply colored. The cuticle covering them desquamates a little, becomes scaly, and the cuticle separates. The spots increase in size; they often run together, so that you have considerable patches of skin in various parts of the body assuming this color. In the end, these discolorations are generally large in size and particularly vivid. They have a bright coppery-color, and the cuticle over them becomes very scaly. They are very strongly marked when they occur in the palms of the hands and soles of the feet; then the contrast of the color of the diseased with the healthy skin is very strong; and the cuticle being thick, cracks and assumes a whitish appearance, and what would have come under the description of that which Willan and Bateman call *syphilitic lepra*, or *syphilitic psoriasis*. 2d. Very frequently syphilitic eruption exhibits itself in the *tubercular* form. In the scaly form just mentioned, the discoloration is superficial, and the coppery-red spots do not rise above the level of the surrounding sound skin; but in the tubercular eruption you have a small kind of eruption with the point more raised, and as that proceeds, the cuticle goes into the scaly state, so that that is in fact a scaly eruption, although there is a tubercular elevation of the cuticle in the first instance. 3d. In other cases, there is a more acute action of the skin—active inflammation, with the formation of inflamed pimples, or of *papulæ*, as they are technically termed. These arise in clusters and patches in various parts of the body; after remaining for a time, they vesicate and suppurate, and that suppuration dries up, and they go into a scaly state, and you have a succession of those pimples forming over various parts of the body: this is called *papular* venereal eruption. 4th. There is another form in which you see it, where pustules, that is, inflammation of the skin, takes place, effusion occurs, and the cuticle is elevated into inflamed pustules; these proceed and form venereal ulcers; that is, the *pustular* venereal eruption. These are the principal forms of eruption, observed as secondary symptoms of syphilis; a *scaly* eruption, which may be called *syphilitic lepra* or *syphilitic psoriasis*, a *tubercular* eruption, a *papular* eruption, and a *pustular* eruption proceeding to ulceration. Now, you do not find these eruptions always distinct; frequently they are so, but sometimes the different characters of the eruptions are united; that is, you will find an eruption partly pustular and partly scaly."*

To these may be added the form of simple cutaneous congestion, or *syphilitic Roseola.* This consists in blotches of very various size, and of a dusky-red or coppery hue; and here it may be observed, that this peculiar coppery appearance characterizes not only the eruptions, but all cicatrices and ulcerations resulting from the syphilitic infection.

Syphilitic Roseola is stated by Prof. Erichsen to follow usually the chancrous excoriation, often even before it is healed, and commonly early in the disease; and he also affirms that it "is very frequently accompanied by an erythematous condition of the throat."

The *scaly* eruption is most apt to appear in the palms and soles, on or near the privates, on the scrotum, penis—even the glans penis—the thigh, buttocks, &c., on the inside of the arms, and on or near the lips. When on the hands and feet, and on the lips, it is often accompanied with fissures and cracks; which are sometimes quite painful, and have hardened edges, and an unhealthy discharge. This form of eruption "almost invariably," says Erichsen," follows the indurated chancre."

---

* South's edition of Chelius, p. 78-9, vol. ii.

The *tubercular* eruption occurs late, and is classed by some as a tertiary symptom. It appears on the tongue, about the face, the penis, uterus, and limbs, and it sometimes runs into a state of ulceration of the creeping, or technically, the *serpiginous* character. This form, according to the same author, is most apt to follow the excoriated chancre.

The *papular* form of eruption is not as common as the other varieties. It sometimes results in syphilitic ulceration, and it is usually preceded by the simple excoriated chancre. These correspondencies, however, between the species of chancre and the kinds of eruption, are not established to entire satisfaction.

The *pustular* eruption, the most common form, frequently results in ulcerations. It may appear on any portion of the body, most frequently on the face and extremities. When occurring on the forehead it has, with a bitter humor, been called the *Corona Veneris*. The postules are sometimes pointed, and sometimes flat, sometimes isolated, and sometimes in groups. Their color is brownish red, and the skin round their bases assumes the same appearance. They sometimes give a good deal of burning pain, and the scabs which form over them are dark and thick, covering often a foul circular ulcer, whose discharges tend to thicken the incrustation. Instead of this process of incrustation—which is called syphilitic *ecthyma* or syphilitic *rupia*, according as the scab is flat or conical—the pustules sometimes result in the formation of little abscesses or boils, which are often quite painful, and of an unhealthy, burrowing character.

Secondary syphilitic ulcers differ from common ulcers, and in some respects resemble the scrofulous sore. They are characterized by the color of their edges, their circular or crescentic shape, and their connection with other syphilitic phenomena. Sometimes the sores are shallow, and heal rapidly; but sometimes again they assume a phagedenic character, eat deeply into the tissues, spread rapidly, and prove very unmanageable. These ulcers generally originate from a syphilitic pustule, tubercle, or vesicle, and the cicatrices they leave are of a brownish purple color, thin, and easily destroyed, like those of scrofulous sores. They are sometimes ranked with tertiary symptoms, so called.

Syphilitic *growths or warts* of various kinds present themselves on the skin, more especially about those parts where it joins the mucous membrane. They occur on this membrane as well as, and perhaps more frequently than, on the skin. They are found on the lips, tongue, palate, tonsils; on the labiæ of the female, outside and inside, and on the scrotum, around the anus, &c., being most frequently detected in the latter situations. Generally speaking they are not so distinctly projecting as the primary warts already mentioned. In the throat they are small and flat, often appearing only like thickening of the mucous membrane of the spot, and thus they are frequently spoken of as *mucous turbercles*. About the privates they are generally large, but still not so exuberant and projecting as the primary affections. They are stated, upon very good authority, to be capable of transmitting themselves by contagion.

Constitutional syphilis as affecting the mucous membrane, presents a variety of symptoms, which may be divided, as the skin affections, into eruptions, ulcers, and growths. The latter have already been sufficiently described: they consist of *warts* or *tubercles*.

The syphilitic *eruptions* of the mucous membrane are analogous to those of the skin, and they have the same tendency to produce ulcers. The *ulcers* differ in character and results, as they affect different portions, and in fact, in the discussion of the whole subject of syphilitic affections of the mucous membrane, it will be more convenient to consider the different portions of this membrane separately.

The *lips* and *cheeks* are liable to sores, similar to the "chapping" from cold, painful cracks in the mucous membrane, whose edges are sometimes hard and irritable; or they may be the seats of mucous tubercles, or of small ulcers.

The *tongue*, besides being liable to the above, may be affected over its whole surface. Its entire mucous membrane is sometimes thickened and furrowed. "In other instances, again, the epithelium is dry, white, and opaque in patches; the surface of the tongue looking as if it had been dyed white, here and there. * * * * * * * * Occasionally a hard, elevated, circumscribed tumor of a dark red or purplish color slowly forms towards the centre of this organ; it increases without pain, and in a gradual manner, and principally occasions inconvenience by its bulk and the impediment it occasions in the movements of the tongue."*

The *throat* also presents various forms of the affection, from a kind of erysipelatous inflammation of the mucous membrane of the palate and fauces, to the various forms of ulcers. The former condition is characterized by the reddened, inflamed appearance of the part; it is sometimes accompanied by spots of ulceration scattered about; and the constitutional symptoms are generally of a highly febrile character.

---

*Erichsen.

The *palate* is sometimes the seat of a sloughing ulcer, which, in its destructive progress, may remove so much of the soft palate as to occasion considerable annoyance in swallowing and in talking. The *tonsils* may also be the seat of ulcers of various kinds; they are generally indolent, foul, and slow to heal. The mucous membrane about the *glottis* is sometimes in a state of chronic swelling, or indurated thickening, and sometimes in a state of ulceration, while, at the same time, the dryness of voice, the cough, with its offensive expectoration, the tenderness on pressure over the front of the neck, &c., show that the *larynx* is also in a state of disease. These cases are sometimes quite critical, as a sudden increase of the swelling at the rim of the glottis may at any time prove fatal.

The *nose* is sometimes the seat of very serious disease. Its mucous membrane may be simply thickened and chronically inflamed, giving rise to the symptoms of coryza, and to the discharge of a bloody pus; or in other cases a troublesome ulceration is set up, with an exceedingly foul discharge, and the formation of unhealthy crustations, which are occasionally separated and thrown out. This ulceration sometimes proceeds rapidly in destroying the structures of the nose; it produces necrosis of the small bones, eats away the septum, and often results in a distressing and repulsive degree of deformity. The disease may even destroy life by extending to the base of the brain, or produce blindness by affecting the eye. One form of this nasal disease—that of a chronic thickening or ulceration of the passages—is called *ozena* syphilitica, a description of which may be found in the lecture on the affections of the nose.

The *vagina*, *urethra*, and the other mucous membranes are not so liable to be affected by syphilis. They are only liable to the secondary growths, which we have already mentioned.

We pass now to the symptoms which are presented by the periosteum and bones. These are generally of later appearance, and have, therefore, been classed with the *tertiary* phenomena of syphilis. The patient, not unfrequently, has presented many of the other symptoms, and considers himself cured, when to his woful disappointment these structures begin to be affected. This class of symptoms is said by some, and perhaps truly, to occur more frequently in those cases in which mercury has been injudiciously administered.

The long bones of the leg, the flat bones of the skull, and in general those least covered with soft tissues, are most liable to become affected; and, as already stated, these affections generally follow those of the skin and mucous membrane. This, however, is not always the case; they sometimes appear at the same time as the *secondary symptoms,* so distinguished by some. The *periosteum* is apt to take on a kind of morbid action, which results in the deposit of a plastic material in its substance, between it and the bone, and on the surface. This deposit produces a tumor, which is sometimes of a gelatinous consistence, and sometimes hard, being in the one instance merely an effusion, under the periosteum, and in the other a diseased and thickened condition of the periosteum and bone. These swellings, or *nodes,* are accompanied by severe nocturnal pain, and, if on the skull, with violent headache. They sometimes resist all treatment, especially those which are solid; while, at other times, they are susceptible of being removed by proper medication. They seldom or never suppurate. In the tubular bones a species of disease presents itself occasionally, which is called *spina ventosa.* Inflammation takes place in the medullary cavity of the bone, which swells up and expands; and these swellings sometimes result in caries or necrosis.

Syphilitic *osteitis* is generally of the chronic character, and usually tends to a gradual hypertrophy and hardening of the portion of bone affected. It is attended with severe pain, especially at night; and sometimes the diseased bone becomes denuded of skin, cellular tissue, and periosteum; and then it falls into necrosis, and exfoliates. Another result of syphilitic osteitis will be found in the various forms of bone-ulcers or *caries;* though both caries and necrosis may also be the results of disease communicated from the soft parts. *Caries* is most frequently found in the cranial bones, though the others, especially those of the extremities, may also be affected in this way. The irritation set up in the brain, from caries of the bones surrounding it, sometimes proves fatal, as may be easily understood in reference to necrosis also. *Necrosis* or *exfoliation* of bone is another result of syphilitic osteitis.

It most frequently attacks the turbinated and other bones of the nose, the processes of the jaw bones, and the bones of the skull, while others are also liable to fall into this condition, especially if in the neighborhood of other diseased structures.

Secondary syphilitic symptoms as presented by different organs. It is probable that in the general cachectic derangement often produced by constitutional syphilis, *all* the organs of the body are more or less affected, at least in their functions, if not organically. In some cases there are palpable organic diseases produced, and these most frequently occur in the *eye* and in the *testicle.* I have seen a case reported in which a softening of the *brain* seemed to be produced by general syphilis; and in the Charleston Medical Journal and Review for May, 1857, Dr. J. J. Chisolm reports a case of *contraction of a muscle,* which he attributes to a syphilitic origin.

The *eye,* of all the organs, is most apt to be affected. It is attacked with an *iritis* very much the same in character as the non-specific form of the disease, and presenting pretty much the same train of symptoms; viz: the red zone round the cornea—composed of the inflamed *straight* vessels that dip down behind the cornea to reach the iris—accompanied with some conjunctival vascularity; the change of color in the iris, from dark to brownish red, or from light to yellowish green, produced by the lymphatic deposit in its substance, which may be seen in spots, dotting its surface more especially towards its free edge; the irregularity of the pupil, caused by adhesions of the iris; in some cases the immobility of the iris under the influence of light; the pain in the eye, and around and above it; the great sensitiveness to the impression of light; the dimness of vision, and sometimes its total loss from lymphatic occlusion of the pupil; the sympathetic fever which is excited, &c., &c.

The *syphilitic* iritis is more particularly characterized by, perhaps, a greater degree of pain, and its greater increase during the night, by the more distinct and larger deposits of lymph, and by the pupil being irregular, generally on the side towards the nose; though the existence of other syphilitic antecedents or concomitants is the only sure test of its specific character. This affection is of the strictly secondary character, and generally follows the indurated chancre. It is classed by Erichsen among the more advanced symptoms of the secondary stage of syphilis; while

Watson places it among the earlier, and adds that, "occasionally it declares itself before the primary disease is well."

Syphilitic enlargement of the testicle is generally of a chronic character. The swelling is sometimes smooth, and sometimes rough and nodulated; in which latter case it has been called "*tubercular syphilitic sarcocele.*" It is not generally painful, at least in the beginning, and in those cases in which it does not run on to suppuration and disorganization. In some cases, however, there is considerable pain, which is greatly increased at night, like most other syphilitic pains. This latter circumstance will often assist in distinguishing it from other forms of chronic orchitis. It generally comes on after most of the secondary symptoms have disappeared, and sometimes when the patient imagines himself cured of all syphilitic disease. Sir Astley Cooper says that, "When one testicle is enlarged, the other is apt to become affected; and I think, in the majority of cases, that the disease exists in both testicles;" while Erichsen and Ricord affirm that very frequently it is confined to one testicle; the former stating that "it is but very rarely that both are diseased." We are not prepared to say which authority is correct. In describing the *tubercular syphilitic sarcocele,* first noticed by Mr. Hamilton, of Dublin, the author last quoted asserts, that here "both testicles are usually affected, but one worse than the other." In this variety of the disease suppuration is more apt to follow, than in the ordinary form; and considerable disorganization and fungoid developments, with burrowing sinusis or fistulæ, are liable to occur, particularly where the patient is of a weakened, strumous, or otherwise cachectic constitution. This form of sarcocele was called tubercular syphilitic sarcocele by Mr. Hamilton, because, as he affirms, the organ is the subject of tubercular deposits, which are apt to soften, suppurate, and sometimes totally destroy the testicle."

Symptoms of secondary syphilis in infants. The period at which these become manifest depends somewhat upon the manner in which the disease has been contracted; in utero from one or both parents; or after birth from the infection resulting from a primary disease, contracted at birth from the mother, or afterwards from the nurse or some other source. We shall consider these modes of infection more particularly when we come to speak of the *causes* of secondary syphilis. The child born syphilitic is almost invariably small, feeble, and sickly; the face is shrivelled and old-looking; and the complexion of the whole body is dusky and unhealthy.

The child is apt to have the "snuffles," as the nurses call it. This is a frequent infantile affection, and often exists in an otherwise healthy child. In the cases under consideration it depends upon a thickened and inflamed condition of the mucous membrane of the nostrils, and is accompanied with the secretion of a viscid, offensive mucus. The skin, either at birth, or afterwards at very indefinite periods, from a few days, to weeks or even months, presents various forms of eruption. In a child born apparently healthy, but one or both of whose parents are infected, or were at the time of conception, or whose mother, at any time during gestation, has had the disease, all manifestations of the inherited malady may be postponed, and in some cases for a long time; but in a child born with the evident syphilitic cachexia, these phenomena soon develope themselves. The "snuffling" sometimes comes on in a day or so, and the eruptions appear in from one to four, or even six weeks. The general health of the child in the meanwhile gets more and more impaired, and it becomes fretful, anæmic, and thin. The eruptions, in most cases, first appear on the lower extremities, especially on the soles of the feet, and about the buttocks and scrotum, then about the mouth, and lastly over the body. These eruptions do not present as many distinct varieties as those on the adult or older child. The different forms seem often to be blended together, the tubercular and scaly forms being perhaps the most prevalent. The skin is dotted with copper-colored blotches, slightly elevated, moist at first, and afterwards, especially when exposed to the air, drying on their surfaces into scales, and then into dark brownish-green scabs. Where the skin folds, they generally fail to scab, and form elevated sores. The lips often present a peculiar appearance from being divided with fissues and cracks; and this condition may also obtain around the anus. The inside of the mouth gets sore with aphthæ; the eruption in some spots runs into ulcerations; and, unless the appropriate treatment is pursued, the little patient sinks lower and lower, and dies from the continued irritation. Where proper measures are taken, the symptoms yield with readiness.

Sometimes, though rarely, syphilitic *iritis* presents itself in infants. Lawrence mentions two cases as coming under his observation. Such, then, are the *symptoms* and *phenomena* presented by constitutional syphilis.

The Ætiology of secondary syphilis. A great deal has been written on this subject and many experiments have been instituted, and observations made, for its elucidation. The "doctors" still "differ," however, though a good many important facts have been arrived at. We will endeavor to condense within our limits whatever is of practical import. We think that the experiments of Ricord prove pretty clearly the unity of that species of venereal virus, which produces what we call constitutional syphilis. Different influences being brought to bear upon the action of this virus, the results of course exhibit a variety of modifications; and to such a degree is this the case, that some eminent writers—Carmichael, Vidal, and others—*dispute the unity* of the cause to which Ricord, Wilson, and others attribute these various manifestations. They mainly base their objections upon the fact, that certain forms of the primary affection are followed by certain forms of secondary disease. But this objection weighs but little, when we remember that one species of chancre, in the person infecting, may produce any other form of chancre, and various constitutional affections in the different persons of those infected from that same person; thus clearly proving, that the differences depend on the ***individual constitutions***, and not on a diversity of causes. That the same species of chancre is *uniformly* followed by the same series of constitutional symptoms, is not yet clearly shown; and even granting that a certain degree of such uniformity in the development of the syphilitic phenomena does exist, it is only what should be expected, when we remember that the same constitutional influences which impress certain peculiarities on the chancre, if still existing when the secondary symptoms appear, should tend to impress these also with some uniformity of appearance and character. Speaking of chancres Ricord says, "The deviations or special forms neither occur nor are developed but after and under the influence of conditions foreign to the specific cause, such as the peculiar constitution of the patient, his previous or concomitant ailments, his health, the general and local treatment to which he has been subjected." And so it is with constitutional syphilis. The ***one cause*** is the syphilitic virus; the differences in the results or ***symptoms*** of the infection are dependent on various influences extraneous to that cause. The cause operates in two ways, by ***contagion*** and by ***hereditary transmission***. When the system becomes infected by ***contagion*** it is generally through the medium of some ***primary*** sore or sores, which are in most cases situated upon the privates. In other cases, however, the contagion is received from those suffering from secondary symptoms alone. That secondary syphilis is ever contagious, is denied by some very high authority, among whom we may mention Ricord and Erichsen; while by others the fact is as positively asserted, in support of which side we may cite M. Vidal, Mr. Wilson, and a high American authority, Prof. Stone of New Orleans, whose opinion is so stated upon the authority of Dr. Bennet Dowler, the talented editor of the New Orleans Medical and Surgical Journal;* who, also a reliable authority, adds the weight of his opinion to that of Prof. S.

It is not meant to affirm that secondary syphilis is *inoculable;* the repeated experiments of Ricord have proved that such is not the case; but we cannot doubt that it is in some cases contracted through the medium of the secretions. This is a consideration of practical importance, and we conceive that the amount of *positive* testimony, which has been rendered in favor of this species of contagion, cannot be overturned by any number of *negative* facts. A syphilitic child may be cured by mercury properly administered to the nurse; and viewing this fact it is not difficult to conceive that the syphilitic as well as the mercurial impression may be transmitted in the same or some analogous way. Dyckman† and other observers maintain that the child may receive the disease from its nurse, without the latter having any primary sore, through the medium of the milk; and undoubtedly instances have occurred of similar infection of women from their husbands years after the primary affections have disappeared. Surely, too, the seminal fluid of the man must be tainted with syphilitic influences when he begets a syphilitic child of a pure woman, she often escaping, but sometimes having it herself. A woman with only secondary syphilis will frequently transmit it to her child, *in utero*, or at the breast; but we are not prepared to say that she ever infects her husband: and this is just what we might expect, for in this case there is seldom, if *ever*, a sufficient transmission of secretion or fluids from her person to his. And it is amazing how long this syphilitic virus may remain in apparent inactivity, till developed by some change of constitution or some external influences, or till a portion is transplanted into some fresh field of action.

Mr. Wilson considers that, once introduced into the system, it is *never* eradicated; and he regards it as the original cause of scrofula, phthisis, and very many of the chronic skin diseases. There are certainly some remarkable analogies among these affections; but we cannot say that these afford sufficient proof to establish the fact of their identity of origin, though they do impress our mind with a *strong presumption* in favor of this view.

---

* See N. O. Med. and Surg. Journal, vol. 11, No. 2, p. 272.

† See South's edition of Chelius, p. 105, vol. ii.

Syphilis from *inheritance* may be received in several ways. First: the *father alone* may transmit it to his offspring when he impregnates the ovum, either while he is suffering under some manifestations of the constitutional affection, or some time after all such symptoms have disappeared, and he has considered himself—with, sometimes, the concurrence of his physician—as a fit subject for matrimony. So long is this period in some cases, that the fact has been used by some to support the doctrine of the ineradicable character of the disease. Secondly: the *mother alone* may transmit the disease to her child at conception, when she either has had or has constitutional syphilis; or she may contract the affection at any time during gestation, and give it to the fœtus; though it would be more correct to consider these cases as instances of contagion. Thirdly: both *father and mother* may be affected, either palpably or in an occult manner, at the period of conception, and so mutually infect their offspring.

The action of the causative agent in constitutional syphilis is variously modified by different circumstances, as has been already stated. A certain combination of circumstances will effect certain modifications, and produce certain results; though we are not yet enabled to appreciate, in a satisfactory manner, the various modes in which these influences act to bring about these various results. We know that different constitutions present different sets of symptoms; and we know that the cause is often latent in one person, and when transferred from that person to a fresh subject, it springs into sudden activity. So that those who consider themselves well will sometimes prove the sources of infection to their children, their consorts or their foster-children. And on this account the practitioner will sometimes find himself in a delicate position. He will be questioned by his patient as to the propriety of matrimony at stated periods after an attack of constitutional syphilis. His opinion, in such cases, should be given freely and plainly. He should state candidly what in his judgment appears to be the amount of risk to the wife or the offspring, and so relieve himself of all responsibility for the future. The fact of either party having *ever* had the disease *should always be considered an objection* to such an alliance. How much this objection should weigh, will depend on various circumstances, which, as far as the professional adviser is concerned, should be carefully estimated in each separate case; and in relation to this matter, we do not know that we can dismiss the subject in a better way than by quoting the following passages from Professor Wilson's work on syphilis, and fully endorsing the latter paragraph. "When this poison is once admitted into the human organism, it has a tendency to accumulate until it has reached a certain point, which may be termed the point of saturation. As soon as the saturating point is reached, an outburst of fever, which results in the elimination of the excess of collected poison, takes place, and the system returns to its wonted tranquility and calm. This process is repeated at intervals, until the intervals become months and years: from severe fever the attacks become trivial and insignificant; and at last the poison is so thoroughly assimilated, that it ceases to accumulate in excessive quantities, and loses its power of exciting a febrile action in the blood of the infected person.

"But although it may be incapable of exciting disease among the tissues accustomed to its presence, *it still retains the power of contaminating new blood; and it is difficult to determine how long this degree of virulence continues.** At first, probably, it may be so far weakened that the wife escapes, but the offspring may suffer; and at last it is rendered so mild that only accidental conditions call upon its powers of doing evil. It remains, however, as I believe, lurking in the blood and in the tissues for many years, and probably for the rest of life.

"Under these circumstances, our answer to the question, as to the time which should intervene between disease and marriage, must necessarily be modified by a variety of conditions; for example, by the nature of the secondary disease, by the known susceptibility of the individual, by his state of health, his occupation, and by the treatment he may have undergone; and something must be known, also, of the health of the proposed wife. Taking the most favorable view of the case, from two to five years should be permitted to elapse, such period being passed under the close observation of the medical man."

The Prognosis of constitutional syphilis may in a great measure be gathered from what has been said in reference to its symptoms and its ætiology. We can hardly be said to be able to form any accurate prognosis in relation to a disease whose ultimate results are so uncertain; but the various circumstances attending each case can well enable us to form at least a *probable prognosis*—if such a paradoxical expression may be permitted—in relation to the general disease; while each local affection will require its own prognosis. The *general prognosis* will be probably favorable, if the proper treatment has not been long deferred, if the constitution is sound, if there is no other constitutional taint, and if the induration left by the primary disease disappears under the treatment.

---

* The italics are ours.

The particular prognosis is to be formed in reference to each symptom or set of symptoms. First, the *skin affections.* The *eruptions* either scab over and leave dark, discolored blotches, which last for years, and sometimes for life; or they run on to ulcerations, especially the *tubercular* and *pustalar* forms. The prognosis of the *syphilitic ulcers* will depend on the condition of the system. If they are of the simple, shallow form, and the constitutional condition is not very unfavorable, they soon heal; but if they are of the phagedenic, or of the serpiginous character, the destruction of tissues, which they sometimes effect, is very great, especially if the constitution is of a cachectic character, or if the general disease is of a severe form. The *skin growth and warts* will remain till the proper treatment is instituted, but can generally be removed.

Secondly, the affections of the *mucous membrane.* The *eruptions,* like those of the skin, either heal over, or run into ulcers; and these ulcers in some cases, as already stated, effect great destruction of parts. The prognosis, when the glottis, or larynx, or both, are affected, is sometimes exceedingly unfavorable; and when the nose is affected with ozena, this distressing disease may continue for a very indefinite period; and in some cases, in which the bones are involved, great deformity must be expected.

Thirdly, the prognosis in reference to the *peritoneal* and *osseus affections* is extremely uncertain in some cases, and very unfavorable in others. The soft peritoneal nodes are more apt to yield to proper treatment, than the hard ones; and the results of syphilitic *caries* or *necrosis* are more or less severe, in accordance with the part affected, and the extent of the diseased portions of bone.

Fourthly, the *organs.* Syphilitic *iritis,* if left to itself, is pretty sure to end in the destruction of the eye; if early treated, it generally proves manageable. The prognosis in reference to syphilitic *affections of the testicles* depends on the character of the disease, and on the condition of the system. If the constitution is of a strumous or otherwise cachectic habit, there is considerable risk of a total destruction of the organ, and more especially if the disease is of the nodulated, tubercular form described by Mr. Hamilton.

Fifthly, the prognosis in reference to *infantile syphilis* is as generally favorable under early and proper treatment, as it is in the last degree unfavorable, when the affection is left to itself; the little sufferer in this case is almost sure to die.

The treatment of secondary syphilis. This is a subject of great practical importance, and one in relation to which there has been a great diversity of opinion. At the present time, however, the profession seems less divided. It is now pretty generally allowed that the mercurial treatment, when practical, and when judiciously administered, is the safest and most reliable; though there is no doubt but that some rare cases will get along very favorably under other plans, and some even without any regular medication at all. Such cases Abernethy used to consider as non-syphilitic; and he and others called them *syphiloid* affections. His main test of the syphilitic character of the disease *was its curability by mercury*. But we cannot see that he had sufficient reason for adopting this view of the subject; while the more recent testimony of many highly capable observers has incontestibly proven, that diseases of truly syphilitic origin have been favorably managed without*mercury, or even any other medicine; though relapses, or, in other words, *failures in the cure*, are much more frequent where mercury has not been used. Mercury is an invaluable remedy in the treatment of the disease; for by far the majority of cases are *checked*, if not cured, by it and its combinations. The constitutional treatment for primary syphilis, already discussed, is to be regarded also as the *prophylactic treatment* for secondary syphilis; and when it fails to prevent this result, its continuance, with certain modifications, constitutes the proper *curative* treatment for the constitutional disease; and very much the same rules are to be observed in its administration. It should not be given while the fever is still present, or when the system is of a decidedly cachectic habit. These conditions are to be first removed, if possible, by the appropriate means. If the system is only debilitated, or of a slightly cachectic *disposition*, it will be proper to combine the mercurial with some strengthening or alterative treatment. The lighter alcoholic drinks may be permitted, in quantities appropriate to the individual case; or some preparation of sarsaparilla, or the iodide of potassium, or the iodide of iron, or some of the mineral acids, may be used. The sarsaparilla may be employed as a vehicle for any of these, or for the iodides of mercury, preparations very useful in certain cases of long standing, and in so called tertiary affections. The cod liver oil and the bitter tonics are also useful. The former is particularly appropriate to those cases in which there is much loss of flesh, and it may also be given in combination with the potassium, the iron, or the sarsaparilla.

The particular form of mercury to be used, will depend somewhat on the stage of the affection, and on the condition of the system. In uncomplicated cases, the bichloride, or corrosive sublimate, is as useful a preparation as can be employed. It should be given in small doses, gradually increased, so as to affect the system by degrees; say one-sixteenth of a grain three times a day, gradually increased to an eighth, or even to one-sixth, and kept at that quantity till the symptoms yield, when the doses should be gradually lessened before stopping it. And we should state here, that, whatever preparation of mercury is used, the remedy must not be rashly forced upon, but gradually insinuated into the system. Salivation is by no means desirable, for it not unfrequently increases the difficulty, by lowering the tone of the system. The mercury in certain cases may be advantageously introduced by inunction; though, generally speaking, in our opinion, this method should be avoided in secondary syphilis whenever any more gradual and manageable system of mercurialism can be adopted. Some stomachs, however, can bear no form of mercury, and in such cases this plan may be adopted. The methods of fumigation and bathing have also been recommended. They may be useful in certain cases, and to a certain extent; but it will be well not to rely on any of these plans to the exclusion of the treatment by the mouth. So much for the treatment of constitutional syphilis *in general*. But certain particular symptoms require particular methods of management, with certain modifications of this general treatment.

The *cutaneous affections* are to be managed on the general principles already laid down, while certain measures should be adopted in reference to the particular manifestations of the disease.

First: the *eruptions*. The fever, which generally ushers in these symptoms, is to be combatted by cooling and antiphlogistic measures. In the choice of the mercurials, the iodides are to be generally preferred; and it is advisable that gentle diaphoretics should be also used, in addition to, or in combination with, the mercurial. In some of the scaly and tubercular forms, the liquor arsenici et hydrargyri iodidi—or *Donovan's solution*—will often be found very useful.

Secondly: the *ulcers* are to be treated—locally as well as constitutionally—according to the characters they assume. Generally they will require active cauterization before a healthy surface is formed, with the after use of some opiate and mercurial dressing; and the black wash with watery solution of opium is a good preparation for this purpose. The ulcerations which form about the nails, or between the toes—syphilitic *onychia*—will sometimes prove very obstinate, and are productive of great annoyance to the patient. They should be thoroughly cauterized as soon as they can be reached. In some cases, the nail has to scale off before they are accessible.

Thirdly: the *growth* and *warts* should be removed by repeated applications of caustic, or by the knife, and by a general mercurial and alterative course of treatment.

The *syphilitic affections of the mucous membrane* also require particular attention, though in the greater number of these affections the constitutional treatment is our main reliance.

The *cracks* and little *ulcers* on the *lips*, the *cheeks*, the *tongue*, and the *throat*, are to be relieved by the application of the solid nitrate of silver, by swabbing the part with a strong solution of the same, or by fumigating them with mercury. If the ulcers assume a sloughing or *serpiginous* character, it will be necessary to use the nitric acid freely, and to wash the parts with the solution of chlorinated soda properly diluted.

The syphilitic affections of the *glottis* and the *larynx* must be carefully watched. At any moment the operation for opening the wind-pipe may be necessary, in order that the respiration may be carried on.

The treatment to be pursued before this becomes necessary, is similar to that for chronic laryngitis in general, and should mainly consist in the local application, in some form, of the nitrate of silver. A pinch of the powdered nitrate, diluted with about ten or twelve parts of very finely pulverized sugar, may be *inhaled* from the extremity of a tube bent towards the end. The charged end of this tube is to be placed over the rima glottidis, while the orifice is to be stopped with the finger. The patient is then directed to make a sudden inspiration, and at the same moment the finger is removed from the outer end. By this means the contents of the tube are drawn in with the breath and scattered over the diseased surface. The nitrate may be applied in solution also, in strength varying from twenty-five grains to a drachm, to the ounce of water. Some simply use a sponge tied to the end of a bent stick of whalebone; but the little injecting apparatus recommended by Erichsen is a much more convenient instrument for the purpose. This is a silver tube, bent towards the end, and perforated round its extremity; and in this tube works a small piston, at the end of which a piece of sponge is attached. The perforated end of the tube being dipped into the solution, the sponge becomes charged, and is to be a little retracted into the tube, by drawing back the piston. The instrument is then to be placed on the rima glottidis, or a little within it; and, by running the piston forward, the fluid is injected over the parts by pressure of the sponge against the little orifices.

The application of the caustic must be repeated at least once a day, until the symptoms improve. Other means should also be employed, according to the intensity of the symptoms. The various counter-irritant lotions or applications may be tried, and if inflammatory symptoms present themselves, the usual antiphlogistic measures should be adopted.

The particular treatment for the syphilitic affections of the *nose* will depend on the nature of such affection. The diseased condition may be confined to the mucous membrane, or it may extend to the bones; in which latter case the treatment is to be conducted on the same principles as for syphilitic caries, necrosis, or osteitis, as the case may be. Some of the mucous ulcerations are of an exceedingly obstinate character, and will not heal till the disease is thoroughly eradicated from the system by constitutional treatment; and they often persist, for some time after, especially if the bones too are affected. Mercurial fumigation may be employed with some advantage in most of these cases; and the occasional application of some strong caustic becomes necessary when there is a tendency to rapid extension and destruction of parts. *Ozena syphilitica* is also a very obstinate affection. Its treatment is particularly considered in the lecture on ozena in general.

The *syphilitic affections of the periosteum and bones* are to be combatted more particularly by the iodine preparations, with or without mercury, according as this agent has not been, or has been already properly employed. When the mercurial course has been carefully and thoroughly pursued for four or five months, and still these "*tertiary*" symptoms remain, its continuance will not probably prove of any benefit; and, indeed, in such cases mercury seems rather to be of absolute injury. Sometimes the nodes will disappear quite rapidly under the absorbent influence of the iodide of potassium, "in doses of from three to five grains, with a drachm of syrup of poppies, and in either decoction of sarsaparilla, or the compound infusion of gention, with some warm tincture. The quick absorption under this treatment is often very surprising; but the cure is not permanent, and the nodes, reappearing again and again, call for the repetition of the medicine, till the disposition to their production is overcome."* Sometimes these nodes run into suppuration; and, if the pus is not early evacuated, it lays bare the surface of the bone by dissecting off its peritoneal covering, and thus gives rise to caries and necrosis.

To prevent this, local means should be employed, in conjunction with the constitutional treatment. A blister will often hasten the absorption; and, commencing before this has healed, some iodine or mercurial ointment should be kept applied over the surface. The hard nodes may be painted with iodine, and then kept lubricated with iodine ointment, or the ointment of iodide of potassium; or, if sufficient mercury has not been used, some mercurial unguent may be employed. Should there appear at any time a decided increase of pain and reddening of the surface in an already soft node, with a more distinct fluctuation, or a lessening of the elastic feeling it may previously have had, and especially if the patient complains of a throbbing in the tumor, it should at once be freely opened, as these symptoms would indicate pretty certainly that a purulent collection had taken place. In persons of otherwise good constitution this result does not often occur, but in those of a weakened body and irritable habit, it may happen, even without the local symptoms mentioned, more especially if the nodes are situated on any of the skull bones, in which case the suppuration is more apt to supervene than when occurring elsewhere; and here it may be followed by more serious results. Hence, in the words of the author just quoted, "Such fluctuating nodes should be emptied by incision, if they do not early yield to the local and constitutional treatment."

In syphilitic *osteitis* the pain is often severe; and the case, therefore, calls for the frequent use of opiates, in conjunction with the mercury. The mild chloride is to be preferred in these cases, unless the patient has already gone through a pretty thorough course of mercury; in which case, as already mentioned, the iodine, or, what is better, the iodide of potassium, should be used. Syphilitic *caries* and *necrosis* must be met with the local treatment appropriate to caries and necrosis in general, in addition to the constitutional treatment for the syphilitic infection. The constitution in these cases is generally of an enfeebled, cachectic character, and the patient is often unable to bear any mercurial. In such cases we have to rely entirely on a tonic treatment, in conjunction with the iodide of potassium. Cod-liver oil, the mineral tonics, or the mineral acids, with the preparations of sarsaparilla used as their vehicle, the nourishing alcoholic drinks, or even, in some cases, the stronger distilled liquors, all recommend themselves for our judicious selection. In relation to the local treatment of caries, it has been suggested that a more healthy action may be brought about, by applying the acid nitrate of mercury freely over the ulcerated portions of bone, or by dressing with the red oxide in ointment or powder. This may be tried in obstinate cases.

---

* South.

Syphilitic iritis must be managed in pretty much the same way as the nonspecific form of the disease. Depletion, local and general, in the first instance, by bleeding and cupping, and then by occasional cathartics; calomel and opium given internally to arrest the deposit of lymph on the iris; and belladonna applied on the lids and brows, or a solution of atropine or hyoscyamine dropped into the eye, to prevent adhesions between the free border of the iris and the chrystaline lens, are the chief agents we have to rely upon. The depletion should be in proportion to the acuteness of the inflammatory symptoms; and when the disease assumes the chronic form, general depletion is to be dispensed with entirely. The calomel and opium should be administered so as to obtain the specific effect of the former as soon as possible. One grain doses of calomel, with the sixth of a grain of opium should be given every two hours, or double these quantities every four hours, increasing the opium, if the bowels are moving, to an amount sufficient to quiet them. Under the influence of the mercurial impression, the further deposit of lymph is put a stop to, and the absorbents take up what has been already effused over the iris. The influence of the belladonna, atropine, or hyosciamine should be kept up throughout the treatment. The experiments of Dr. Reisinger, would seem to have established the fact that the latter agent is the one most to be preferred. He dissolved a grain of the hyoscyamine in a drachm of distilled water, and one drop of a solution of this strength, was found very effectual.* Sometimes the disease assumes an obstinate, chronic character, especially in cachectic habits. In these cases we have to resort to counter irritation by means of repeated blisters to the temples and back of the neck, with the adoption of general tonic measures, or a slow mercurial treatment, as to each particular case may be most appropriate. Donovan's solution will often be of service in such cases.

In the treatment of the syphilitic *enlargement of the testicle*, we must almost entirely depend upon the constitutional measures. The simple form is caused by the deposit of lymph in the substance of the organ; and the cessation of that deposit, with the absorption of what has been already effused, and the consequent reduction of the testicle to its normal size, will generally be effected by a thorough mercurial course.

If, however, there should be any active inflammatory symptoms, they must be met with the usual antiphlogistic treatment. But this is seldom the case, the syphilitic affection being more a chronic *enlargement* than an orchitis.

The mercurial course should be followed by the administration of the iodide of potassium or some preparation of iodine for ten days or a fortnight, or longer if necessary, in order to remove any swelling which may still remain. Some iodine wash or ointment may be used locally; or, as recommended by Prof. Erichsen, the testicle may be strapped up with the plaster of ammoniac with mercury, diluted with an equal part of belladonna plaster.

The tubercular form of the disease will generally require a more tonic treatment, and the use, more particularly, of the iodine combinations, with or without some form of mercury, according to the condition of the system. The local measures, before the disease has advanced so far that fungous growths have appeared, should be of the depletive and resolvent kinds. Leeches in many cases will be appropriate, followed by lead or iodine lotions, or the ointment of the iodide of lead. A fungus tends to continue increasing in size till it destroys the whole organ; it should always, therefore, be destroyed. While still small, it may be removed by sprinkling it now and then with calomel or the red oxide of mercury, and keeping it bound down with a compress of lint, over which a few adhesive strips are passed tightly. If too large to be managed in this way, it must be removed with a knife; and the subsequent granulating process must be restrained with caustic, whenever it tends to shoot above the surface.

---

* See Watson's Practice, p 206–7—Article Iritis.

The *treatment* of *infantile* syphilis is more satisfactory than that of any other form in which the disease shows itself. When the mercury is given by the mouth, the hydrargyrum cum creta, in one or two grain doses three times a day, adding if necessary a half grain of Dover's powder to each dose, is the preparation most adapted to these cases; but the treatment by inunction as recommended by Sir B. Brodie and Prof. Erichsen,* is perhaps to be preferred, as the medicine is apt to irritate the tender mucous membrane. "The most convenient plan is, as recommended by Sir Benjamin, to spread ʒi of mercurial ointment on the under part of a flannel roller stitched round the thigh just above the knee, and to renew this every day. This treatment should be continued for two or three weeks until all rash and snuffling have disappeared, when the mercury having been discontinued, the cure may be perfected by the administration of small doses of the iodide of potassium in milk or cod-liver oil."† The child may be cured in utero, when we suspect that the mother is infected, by putting the latter on the proper mercurial treatment, as soon as possible after pregnancy: and this too will often prevent the miscarriage which is so apt to occur in such cases. The treatment of the mother should be pursued with great care "and by inunction rather than by mercury administered by the mouth." ‡ The *eruptions* should be washed at first with the calomel and lime water (Black wash;) and afterwards, if they take on an indolent chronic character, some more stimulating or astringent application must be used, such as the solutions of nitrate of silver, or of the sulphate of zinc or copper. Donovan's solution internally administered will sometimes be of service in obstinate cases. S. L.

---

* Erichsen's System of Surgery, Am. Ed., p. 437.

† Loc. cit. ‡ Idem, p. 436.

ESSAY No. 3.

EFFECTS OF HEAT AND COLD.

Burns and Scalds—Frost Bite—Local Anæsthesia by Cold.

Extreme degrees of either heat or cold, acting upon any part of the body will quickly cause the death thereof, and, should the individual be very much exposed to either, loss of life is frequently the result. The effects of heat present themselves to the surgeon, as resulting either from *burns* or *scalds;* burns being the result of contact with flame or heated solids—and scalds, the effect of heated fluids when brought into contact with the body. The symptoms, effects, and treatment of burns and scalds are almost exactly the same, the only difference being that scalds are generally much more severe and serious than burns; and, the more oily or thicker the heated liquid be, the severer will be the scald, other things being equal. The amount of general irritation, or the constitutional effects of these accidents, will depend on the extent of surface involved in the injury. A very deep and severe burn or scald of limited extent, is far less apt to cause constitutional disturbance, than very slight ones spreading over a large surface of the body. The symptoms and constitutional results of these accidents have been divided into three different periods. The first, or that immediately following the reception of the injury, embraces those symptoms that result apparently from the shock. At this time the vital energies appear to be stunned, or even paralyzed. Constant cold is complained of, and frequent shivering fits occur: and if the injury has been very great the patient may die before the second stage, or that of reaction, sets in. In this stage of the affection, stimulants—as brandy, whiskey, &c.,—should be freely given, every effort made to excite reaction as soon as possible, and opium or some one of its preparations freely given to allay irritation and relieve pain. As soon as reaction sets in, or during the second stage—which follows the first in a longer or shorter period, in proportion to the extent of the injury—fever arises, and its violence will depend on the severity of the burn or intensity of the shock. Reaction may be so slight as only to cause slight inflammation, with little or no swelling or pain; while, again, it may be so severe as to occasion an extreme amount of inflammation, extending and increasing until the tissues under the skin become involved, and causing even profuse suppuration. This stage of the burn is, like the other two, of varying duration, but generally lasts about seven or eight days, and not unfrequently it is ended by death. From the position of the burn, inflammation of the thoracic or abdominal viscera, the peritoneum, or the air passages and throat, frequently occurs. "It is in this state of burn that, that very remarkable and serious sequela, perforating ulcer of the duodenum, is especially apt to occur. Mr. Curling, who first attracted attention to it, explained its occurrence by the highly probable supposition, that Brunner's glands endeavor by an increased action to compensate for the suppression of the exhalation of the skin, consequent upon the burn, and that the irritation thus induced tends to inflammation and ulceration of them." Following this is the third stage, ending in convalescence or death. Where tending to convalescence, the local and general symptoms will all become less urgent, and the suffering in every respect less; but when tending to death, the symptoms and sufferings are more urgent, violent suppuration sets in, followed frequently by hectic, pneumonia, or pleurisy. The local effects of burns and scalds, have generally been treated of, under three divisions. The first division includes those cases in which the epidermis only is injured, when an effusion of serum lifts and separates this from the true skin: the second division consists of cases in which the true skin is also destroyed, and, separating, leaves a deep and painful ulcer: and under the third division fall such cases as are accompanied by the destruction of the deeper tissues; as where some heated metal or burning liquid passes over the body or any of the limbs, and destroys skin, muscle, and perhaps even the bone, or it may be an entire limb.

The constitutional treatment of the two last stages of burns must be regulated entirely upon general principles. Where there is violent inflammation, it must be combatted by antiphlogistic remedies; or if exhaustion comes on, the strength must be sustained with liberal diet, tonics, bark, and, if necessary, wine. In the local treatment of burns, numerous remedies have, from time to time, been recommended: and surgeons have differed widely as to the proper course to be pursued.

Much diversity of opinion has been expressed, for example, with regard to the puncturing of the vesicle and letting out the serum in the first stage. Thus Latta, writing in 1795, says, that "it hath been disputed whether the blisters which arise on burns ought to be opened or let alone till they dry up of themselves, but from repeated experience, I am convinced, that as soon as a blister the size of a small pea makes its appearance, it ought to be opened, by pushing the point of a lancet gently into it with the flat side next the skin, and near the base of the blister; but taking care not to hurt the true skin which lies underneath." On the contrary, Sir Astley Cooper declares that "the danger of the first stage (simple vesication: in which the cuticle remains unbroken) is but little, provided the vesications are not disturbed, however extensive they may be; although on this subject there has been a severe controversy: in this state, the liquor plumb, acit. dil. et spirit. vin. should be frequently applied cold; the chief object is to keep the blister from breaking, as a considerable discharge would come on: otherwise no great irritation and consequently no attendant danger arise." Thus very different, nay contradictory, opinions are even at the present day entertained by surgeons upon this subject. It appears that the chief reason for opening the blisters, is, to prevent their extension by a farther accumulation of serum; and that the reason for preserving them unbroken, is, to prevent a greater exposure of cutis vera by a removal of the epidermis.

There can be no doubt, that where the blisters are extensive and a large amount of serum is already poured out, the best course will be to preserve the blisters unbroken, as by so doing we prevent the exposure of a large surface, raw and painful; but where the blisters are small and near each other, as is often the case, it will be better to let the serum out by a minute puncture made as above. Thus shall the vesicles be prevented from running into each other, and, by making the opening as advised by Latta, the epidermis will be found to remain for some time unremoved, and so the inflamed surface of the cutis be somewhat protected. During this stage, moderately stimulating lotions may be used with benefit. The part may be covered by folds of soft lint moistened with vinegar, spirits of wine, or some such liquid, either alone or combined with olive, or some other bland oil. Should the epidermis be removed, and the inflamed skin be already exposed to any extent, it will be better to cover the whole wound with some cooling application, which shall quiet and relieve pain by its soothing effect upon the exposed and irritated nervous papillæ, while they serve at the same time to exclude the air. For this purpose cloths saturated with olive oil and lime water, will often act well and give great relief. With the same object the entire wounded part has been enveloped in cotton. To this substance, however, there is one great objection. Parts of the cotton, becoming saturated by the discharge, are loosened and hang in dirty, heavy masses, while the rest sticks firmly to the wound, and can only be removed with great pain and suffering. No substance should be used which is apt, from its fibrous natûre, or other cause, to form a single mass, difficult to be divided, or to be removed in small particles. The flour of wheat, from its soft and bland qualities, affords, perhaps, the pleasantest application for the sufferer, and by forming a paste when moistened, it effectually excludes the air; while by gradually absorbing the discharge it adds much to the comfort of the patient, and, at the same time, it can easily be removed from any part and at any time. As soon as the accident has occurred, the person should be placed in a sheet or blanket, every part of the burn well covered with flour by sprinking it from the hand, and the patient lightly covered.

As soon as the flour over any part of the wound becomes saturated by the discharge, it will be elevated, grow hard and form a crust. This can easily be removed, and the flour may be freshly applied if this be thought advisable; or if an ulcer is thus exposed, it should be dressed with lime water and oil, until it begins to granulate, when a solution of sulphate of zinc may be substituted as more healing.

When the skin has been entirely destroyed an eschar forms, and soon sloughing, leaves a painful suppurating surface. It is in this class of burns that the application of turpentine has been found so efficacious. This may be used either alone or in combination. It appears best, however, at first to use it pure and alone. As soon as the slough has separated, great care should be taken to promote healing. This will perhaps be accomplished best by the use of slightly stimulating lotions; and among these a solution of the sulphate of zinc will be found peculiarly efficacious. During the healing process, and for some time after the wound has closed, great care should be observed to guard against the contraction of the parts affected, which is so often found to result from burns, and which is consequent upon the hardening and contraction of the cicatrix. This will be most easily prevented by pressure, constantly and judiciously applied.

When two parts of the body lying adjacent to each other, as the buttocks, or chin and chest, have their opposed surfaces burnt, they sometimes unite during the healing process, and thus some most hideous deformities have been caused. These accidents are indeed difficult of cure, and should be most carefully guarded against by placing between the raw surfaces bits of oiled cloth, or some such application. If the entire thickness of a limb be destroyed, amputation becomes necessary, and the case should be treated as one of death of the part from any other cause.

After burns have quite healed up, a peculiar process of hardening and contraction takes place in the cicatrix, giving thereto a singular and characteristic, smooth shining and puckered appearance. As has been said, this sometimes proceeds to such an extent as to cause great deformity, and to demand relief by the knife. In such cases the incisions should be made wide of the cicatrix, every part of which should be carefully removed, as the tissues, on healing, are exceedingly prone to resume their deformed condition by the same process of hardening and contraction. Indeed, so apt are they to do this, that a cure is seldom effected before several operations have been performed, and in some cases cannot be attained at all. Before leaving this subject, it will be well to recommend most highly the use of opiates during the entire treatment of these most painful accidents. Particularly will they be found useful in cases in which large portions of skin are denuded, the epidermis alone being destroyed. In such cases the ends of the nerves are exposed, and their irritability is enhanced to such a degree as to cause great suffering; indeed, these are the most painful kinds of burn. In them the sufferer calls loudly for relief from *actual pain*, and opium in large doses should be regarded as indispensable.

Frost Bite.

The effects of cold are generally treated of under the heads of *constitutional* and *local.* The latter alone come strictly under the observation of the surgeon. The local effects of cold, though equally evident in any part of the body that may be brought under its influence, are, from the nature of things, most frequently exhibited upon the ears, nose, and extremities, these parts being generally most exposed. When any part of the body is exposed for a short time to intense cold, it at once becomes shrunken, stiff, pale and numb. Soon after this, which may be likened to the stage of shock in burns, reaction sets in, followed by slight inflammation, with redness, and a peculiar burning pain. If the exposure be longer continued, all sensation in the part is eventually lost, and it assumes a livid hue, mortifies rapidly, and, as soon as reaction sets in, it becomes black and dry, and, sooner or later, is thrown off by the healthy parts. *In the treatment of frost bite*, the great evil to be guarded against is the too sudden occurrence of reaction, or its going on to too great an extent. Every exertion should be made to bring this on slowly, and gradually, and to restrain it within moderate limits. Hence the patient should be kept in a rather cold room, and the injured part gently rubbed with some cold application, pounded ice, or snow; and, if these cannot be got, the hand, frequently immersed in cold water, and so kept cold, may be used with advantage. All approach to the fire should be most strictly avoided during this stage of the injury. Soon redness and pain, followed by motion, will be perceived, and when reaction thus begins, the injured part should be enveloped in warm flannel, and kept quiet; and, if necessary, the patient may take some slight stimulant. Should gangrene set in, and it be only of slight extent, we may permit the living parts to cast off the dead, without interference; but should mortification be so extensive as to demand the amputation of the part, this operation should be performed as soon as the line of demarkation is formed. In such case the same rules are to be followed, as where amputation is performed for the relief of gangrene from any other cause.

Local Anæsthesia by Cold.

The benumbing effect of cold, when applied to any part of the body, was long since perceived, and has caused it of late to be highly recommended as an anæsthetic agent. Since the discovery of chloroform, and its introduction as an anæsthetic, great exertions have been made to find an agent possessing similar anæsthetic properties, without containing therewith the dangerous qualities of that agent. Thus far, however, all efforts with this object in view have totally failed. Although cold, when locally applied, will not act as powerfully in destroying or preventing pain, as the inhalation of chloroform, yet there can be no doubt that by it, and when it is properly used, the skin being thoroughly numbed, pain is in a great measure prevented. When this agent is to be used, pounded ice, or snow with salt, or some other freezing mixture, is enclosed in india rubber, oil silk, or some other material impervious to water, and applied over and around the part through which the incision is to pass. The mixture should be kept in contact with the part until, by its influence, the skin is thoroughly numbed, and almost perfectly insensible. The operation may then be performed with but little pain. The advantage of this as an anæsthetic agent is, that its effects are entirely local; in such cases, therefore, as, from peculiar constitutional states, can not be put under the influence of chloroform, cold thus used will afford an available resource.

The disadvantages of this agent are, that it requires such arrangement for its proper application, that this alone would often prevent its use; and that it is sometimes impossible to procure a freezing mixture at all. Hence in many cases the anæsthetic influence of cold cannot be procured. Thus, then, while it affords a valuable resource under certain circumstances, local anæsthesia from cold can never, in general practice, be used as a substitute for the speedy, perfect, and, in most cases, safe influence of chloroform. Indeed no agent yet known to the profession combines so many advantages, with so few dangerous qualities as chloroform; and it still stands at the head of the list of anæsthetics, among which, however, the use of cold, locally applied, must be given a prominent position. T. S. W.

ESSAY No. 4.

TUMORS—THEIR VARIETIES—NON-MALIGNANT TUMORS—ENCYSTED TUMORS—MUCOUS TUBERCLE—WARTS—CORNS—POLYPI—FATTY TUMORS—FIBRO-CELLULAR AND FIBROUS TUMORS—MALIGNANT GROWTHS OR CANCERS—ENCEPHELOID CANCER—SCIRRHUS MELANOSIS—COLLOID CANCER—EPITHELIAL CANCER.

The older surgeons, under the head of *tumors*, treated of every swelling or enlargement that might occur in any part of the body. Dividing these *enlargements* into the *acute* and *chronic*, they included, in the first class, or that of acute tumors, every swelling which was accompanied by inflammation. Hence *boils*, *inflammation of the ear*, or any of the *joints*, &c., &c., were there described, while any swelling, not accompanied by active inflammation was placed among chronic tumors; and *ascites*, *emphysema*, *tympanitis*, &c , &c., fell under this division. Thus "every preternatural enlargement in whatever part of the body it is seated may be termed a tumor," (Bell's system of surgery;) and "tumors or swellings in any part of the body may be acute or chronic," (Lata's surgery,) according to the classification and arrangement of the older writers. Such an arrangement, however, is not in accordance with the ideas of more recent authors; and, while many of the swellings, formerly known as tumors, are now regarded as specialities, such swellings only are spoken of as tumors, as assume a *definite form* and are *the result of morbid action.* A tumor then is "a morbid growth assuming more or less a definite form, and distinct from what we more appropriately term a mere swelling or enlargement of a part." (Skey.)

Tumors have been divided into three classes. In the first are arranged those which only exist *locally*, and exert no influence *generally*, nor are in any way *the result of constitutional causes*; hence these are styled, *innocent*, *benign*, or *local*, and are generally cured without difficulty. Under the second division come such growths as not only exhibit themselves *locally*, but are *the results* of a *constitutional depravity*, and are accompanied by a *peculiar cachexy;* hence these growths are difficult to manage, and are called *malignant*. Intermediate between these two classes, and partaking of the characteristics of them both, is the third division, or that of *semi-malignant* growths. Among the innocent, or benign tumors, we find all those morbid enlargements which consist of a *circumscribed swelling*, accompanied by little or no inflammation, generally painless, and which only give rise to local inconvenience. Perhaps the most distinguishing characteristic of this form of tumor is, that, when once removed, it has no tendency to return: hence it sometimes is called *local*. These local or benign tumors present several varieties, the first of which, or that most frequently met with, is the *encysted;* so called from being composed of one or more *cysts*.

This form of tumor may originate in two distinct ways, and hence has been divided into two classes. In the first class some excretory duct becomes closed from hypertrophy of its walls, inflammation, or other cause, and a natural secretion being then retained, a tumor is eventually formed by its gradual accumulation.

In the second class a cyst is developed somewhere in the cellular tissues—perhaps without any evident cause—and from its lining membrane constantly pouring out a secretion which is retained, a gradually enlarging tumor is formed. In the first class the tumor results from the accidental accumulation of a perfectly natural secretion, whilst in the second it is an entirely new growth consequent upon some morbid action.

Tumors of the first description, originating in the closure of the excretory ducts of the sebaceous and other glands, are frequently met with in every part of the body, but are most commonly found about the head and face. A modification of this form of tumor occurs when one or more of the bursæ, from a morbid state of their internal membrane, enlarge and become distended by their own secretions.

Encysted tumors resulting from the closure of an excretory duct, (atheromatous tumors from *αϑηρα*, pap) vary greatly in size and in the number in which they are found; sometimes existing as mere specks, and only one or two being evident; and at others growing to an immense size, or in great numbers. They are generally found about the scalp, neck, and face, but many occur in any part of the body; are soft, yielding, and elastic to the touch, and of a round or oval form. This, however, is not always the case, as the tumor is in some rare cases hard, firm, and unyielding, or perhaps soft, and fluctuating; so much so indeed as to be entirely mistaken.

When first formed the cyst is perfectly free from all surrounding structures, and may with ease be moved under the skin: at a later period, however, attachments are formed, and if inflammation occurs, these grow proportionally firmer.

Persons of every age and both sexes are liable to this affection, but it is much more common among females of thirty or forty years than with any other class of individuals. The tumor is composed of "a cyst which varies in thickness, being sometimes thin, filamentous and soft, at others so thick, hard, laminated and elastic, that it is impossible not to believe it to be a new formation." (Erichsen.)

These cysts generally contain a soft cheesy mass, of a whitish-yellow color, sometimes mixed with a more fluid part, of a greenish color, or with a fatty matter. These, too, may all be found in separate cysts, yet so united as to form a single tumor. This, however, is but rarely the case. If undisturbed, these tumors grow slowly and give no pain. They occasionally, however, give rise to a singular growth, which is sometimes mistaken for genuine horn. When the tumor has been opened, the contents of the cyst gradually oozing out, become hard on drying, and assume a brown color; and, being slowly but constantly added to from below, the accumulation is thus gradually pushed up, and assumes a horn-like appearance. This sometimes occurs without the tumor having been opened; for, in those growths which arise in neighborhoods where the sebaceous follicles are large, a small opening may be found in the centre of the tumor, communicating with the interior of the cyst, and through this opening the intercystic matter may escape, and give rise to the same phenomena as those described above as following an artificial opening.

Such horny growths may form on any part of the body, but they are most frequently formed about the head, simply because the tumor in which they originate is most frequent in that locality. If undisturbed, these cysts may after some time inflame and suppurate: and, inflammation being also set up in the surrounding structures, the cyst if small may be entirely thrown off. Where the growth is too large for this, the inflammation may extend to the superimposed skin, which, becoming adherent to the cyst, ulcerates, and so exposes its contents, which soon putrify and are discharged by an unhealthy suppuration.

In more unfavorable cases a new vitality appears to be set up in the tumor; which then assumes great vascularity, and becomes firmly attached to the subjacent parts, loses its smooth rounded form, and becomes uneven and nodulated, at the same time giving rise to an offensive, irritating discharge, and, in fact, presenting the appearance of a truly malignant growth.

Encysted tumors may perhaps be mistaken for purulent collections, or for *steatomatous* or *fatty* tumors.

To distinguish them from purulent collections, a little of their contents may be pressed out through the dilated duct in their centre, or removed by a small grooved needle, and examined under a microscope. The slow growth of the tumor too, with its mobility, will generally prevent such a mistake. From fatty tumors the encysted may be distinguished by the greater firmness and regularity of the former, as well as by the position of the growth, as it is rare to find a steatomatous tumor in any part of the body where fat does not exist while in perfect health. Where there is doubt, it will be well to draw off the contents of the tumor and examine them, as advised by Erichsen.

In the treatment of these tumors, surgeons generally resort at once to the knife. Great exertions were made in former times to bring about resolution, by stimulating lotions, soothing applications, pressure, &c. These, however, have all fallen into disuse, and are we believe but seldom thought of. Even caustic, so highly spoken of at one time, is now scarcely ever resorted to, as a curative means. Decidedly the best and only certain method of treating encysted sebaceous tumors, is to remove them completely with the knife. When one of these tumors is to be removed, care should be taken that the constitution is in a healthy state, and the weather mild, as erysipelas sometimes follows the operation, particularly when performed about the head.

To remove a growth of this kind, a longitudinal incision should be made, through the integuments and cyst, extending the entire length of the tumor, and thoroughly emptying it. The first finger and thumb should then be placed on either side of the incision, flat upon the skin, and the integuments pressed back on either side, so as to expose the cut edges of the membrane of the cyst. These should then be seized, by a pair of forceps, and drawn out; and any bands by which they may be connected must be divided by the scalpel. Sometimes the tumor adheres firmly to the skin, and also to the subjacent textures: in such cases it becomes necessary to dissect the cyst carefully out. Perhaps it will be best in these cases to use the hand, or handle of the scalpel, in disuniting the attachments of the tumor, as recommended by Skey. By so doing we more certainly remove every part of the cyst, because the operation being comparatively bloodless, the parts are more plainly seen, and hence more easily recognized and separated. Great care should be taken to remove every part of the cyst; for though Bell has positively affirmed that parts of the membrane may be left without causing subsequent inconvenience, yet such has not been the experience of more recent authors, or surgeons of the present day. It now appears to be generally admitted, that, if any portion of the intracystic membrane be left after the operation is concluded, this will almost certainly cause unpleasant fistulæ, the cure of which will be troublesome. When the cyst is very large, or where ulceration has occurred, it may be desirable to remove a part of the integuments. Where this is the case, as much of the skin as is to be removed should be included between two elliptical, or semi-circular incisions, and so taken away with the tumor.

It has been advised to remove these tumors by first making a semicircular incision around their bases, then carefully dissecting them from the subjacent textures, and lastly turning them over and separating them from the skin and integuments. This, however, is a more painful operation, possesses no advantages, and has been quite abandoned. Should any arteries bleed after the tumor is removed, they should be tied, and every effort made to cause healing by the first intention. Where the patient is, from nervous habit or other cause, unable to bear the knife, we may resort to the seton, as recommended by Bell, or to the use of some stimulating injection, as advised by Sir Astley Cooper. Where the seton is used it should pass quite through the tumor in its vertical axis, and the lower opening must be large enough to permit the free discharge of the contained matter. When the injection is preferred, the cyst should be emptied of its contents, and then some stimulating injection be thrown into it. Cooper used a solution of sulph of zinc in rose water; but perhaps the best injection we can use in such cases is the tr. of iodine: this is most efficient, and less apt to cause unpleasant results when retained. The surgeon, however, must select the agent he prefers; bearing in mind, that his object is to set up such an amount of inflammation in the membrane of the cyst, *as shall cause the obliteration of its cavity by the adhesion of its walls.*

Whether the knife, seton or injection be resorted to, must be determined by the surgeon in each individual case. The knife is much quicker, gives little or no more pain than the other two, and is much more certain in its effects. One of these tumors once removed by it, never returns. Where the knife can not be used, or is greatly objected to, the seton may be tried; but it is slow, troublesome, and by no means certain. Where the growth is very large, or where the scar resulting from a wound would be unsightly, and under other circumstances, at the discretion of the surgeon, injection may be preferred; but it is even less certain in its results than the seton. It may, however, be repeated as often as it fails, and it will frequently succeed at last, though failing in several successive trials.

Where an encysted tumor arises from the closure of an excretory duct of a large gland, as the submaxillary, for example, it should be relieved by restoring the outlet to its secretion. This may be done by removing a part of the walls of the cyst, and causing a fistulous opening to take the place of the natural excretory duct. Where this fails or is inconvenient, the tumor should be freely opened, and the cavity allowed to become obliterated by granulation.

There are, in various parts of the body, small closed cavities, lined by a secreting membrane, and, in health, containing a small amount of thin unctuous liquid. In a state of disease the liquid in these cavities may increase to such an amount as to occasion a considerable tumor. Examples of this form of morbid growth are more frequent among the "bursæ mucosæ" about the wrist, the knee and foot. They are formed by a membrane varying in structure, being sometimes soft and thin, and at others hard, firm, and even fibrinous. Within this is contained a thin serous liquid of a brown or yellowish color, in which a number of hard, gray, or yellow looking granular bodies are sometimes found. These small bodies are said sometimes to exist in such numbers as to cause the tumor to appear firm and even hard to the touch.

These tumors are generally of slow growth, increasing gradually for some time, and then becoming stationary for a while, and either disappearing by suppuration, or growing firm and hard by a deposit of fibrin.

The treatment of these growths consists in inducing resolution by the use of stimulating applications, and where these fail, the seton or tapping followed by the injection of tincture of iodine, or some other method, which will excite granulation of the walls, and thus cause the obliteration of the cavity, may be resorted to. Indeed, Bell advises as all that is necessary in ordinary cases, to give the tumor a sharp, quick blow with "some hard flat substance as a book," so bursting it, and giving exit to its contents. Where these methods fail, or where the tumor has become fibrinous, removal by the knife will cause a perfect cure.

The *simple* and *compound serous cysts* form another variety of cystic tumor. These are found in the cellular tissue, around the tendons, but most frequently about the organs of reproduction.

These growths are always new formations, and are composed of a cystic membrane containing a liquid of its own secretion.

In the *simple cysts* this membrane is thin and expanded, and the contained liquid viscid, thin, and of a pale straw color. The treatment of this form of cystic tumor differs in no respect from that just described. Where the cyst is small, pressure, stimulating applications, &c., may be used with success. When the growth is a large one, we must resort to the "evacuation of its contents by puncture or incision, and the injection of tincture of iodine or some stimulating liquid," followed by pressure to induce adhesion, or the subcutaneous section, the seton, or some other means by which we may cause a sufficient amount of inflammation to ensure the obliteration of the cavity by granulation or adhesion.

The *compound* or *multilocular* cysts differ from the simple only in being composed of a number of cysts grouped together, so as to form a single tumor. They are generally found about the female breasts, the broad ligaments, or the ovaries, especially in the latter organs. The treatment consists in puncturing the cyst, drawing off its contents, and using the injection as above. From the nature of this growth it will be found difficult of cure. There being many cells, separated and distinct from each other, it is impossible, by a single puncture, to draw off the whole of the liquid, and so completely to evacuate the tumor. Hence the injection can only act on a part, repeated operations become necessary, and eventual success is exceedingly doubtful.

The *pilo-cystic tumor,* (from *pilus,* a hair,) containing hair, fatty matter, and perhaps portions of bone, are sometimes met with, particularly in the region of the ovaries. These require no special treatment.

There is an encysted tumor often met with, and confined to no particular part of the body, though most frequently growing in the neighborhood of the genetalia. This is the *sarcomatous or fleshy tumors,* (from σαρξ, flesh,) and it is found as often in the male as in the female, but is more common among the black than the white races. Indeed, the negro is very liable to these "*wens,*" and sometimes present them in great numbers. They are firm and not elastic, are smooth and pedunculated, grow slowly, generally give no pain, and are quite movable. The cystic contents vary in consistency, from a perfectly liquid to an almost solid state, and are sometimes of a clear, nearly white color, and again almost black.

Erichsen regards this kind of growths as a "simple hypertrophy of the fibro-cellular element of the part affected."

In the early stages, wens may be removed while yet very small, by pressure, and the local use of iodine. This plan, however, will often fail, and then the knife furnishes the only resource. When removed by it, they never return. The operation for their removal differs in no respect from that adopted for removing any simple encysted tumor.

Some surgeons prefer removing the cyst unopened. If this method be selected, the membrane of the cyst should be laid bare by a crucial incision, the flaps formed by which must be carefully turned back, either by dissection with the knife, or, what is preferable, by gently separating them with the hand or handle of the scalpel, and the cyst at the same time drawn forward.

The *hæmatomatous tumor*, (from αιμα, blood,) is a cystic growth not of frequent occurrence. It may arise from several causes. The entering of blood into a previously existing cyst, the transformation of a nævous, or the closure of a vein, followed by its dilatation and conversion into a cyst, may cause this sanguinary tumor. The treatment consists in removal by the knife.

Tumors connected with the Integuments.

The vascularity of any part of the cutis becoming increased, and this being accompanied by a more abundant deposit of laminated cuticle, small tumors are sometimes formed, varying somewhat in general character and appearance, according to the locality in which they are found. When formed in some covered part of the body, as in the groin, under the arm, or about the genitals, they are soft and yielding, and are known as ***mucous tubercles.***

The same kind of growth, when formed on an exposed part of the body, becomes much firmer, and may even present an uneven, horney surface. Such tumors are termed *warts.* When these tumors arise from any of the mucous membranes, they are very irritable, and often bleed from very slight causes.

About the foot too, and particularly over and about the joints of the toes, tumors are very frequently formed by a thickening and induration of the skin, which give great pain if pressed upon, but which, although sometimes said to smart and give pain on any sudden change of weather, do not generally do so, except when irritated. In this position the tumor is styled a "*corn.*" The growth of each of these tumors is generally slow, and progresses only to a limited extent, though they are said sometimes to have attained a considerable size. They give no pain unless irritated, and never return if once perfectly removed.

In their treatment, stimulating applications, caustic, and the stronger acids may be tried. Bell recommends very highly "crude sal amoniac," or a "solution of mercury in spirits of nitre;" and Dorsey speaks highly of the volatile alkali, and the nitric or sulphuric acids. Where these fail, after having been persevered with for some time, the ligature or knife may be resorted to. When the tumor is small and narrow at its base, the ligature may be preferred, but under other circumstances the knife will be found much quicker, and far less painful. Either will be perfectly efficient. Perhaps under ordinary circumstances it will be best to combine the use of the acids or caustic with that of the knife; applying the former every morning, and carefully removing all that portion of the growth which has been destroyed with a sharp knife before re-applying the caustic. It is said that few warts or corns will resist this course if continued for some time. I have in several instances succeeded perfectly, by this plan, in removing such growths, in from eight to ten days. When the growth arises from a mucous surface, the knife should generally be preferred to all other means of cure. In the choice of remedies much must depend, too, upon the situation of the tumor.

Polypi, or pendulous tumors, growing from the mucous membrane in some part of the body, have been divided into the true *mucous polypus*—a soft tumor, growing rapidly, and bleeding after the slightest irritation—and a *firm* growth, formed under, and covered by the mucous membrane. The first is generally formed in the nose and uterus. Many deny that the second belongs to this class at all. It does not readily bleed, is apt to ulcerate, and often degenerates and assumes a cancerous nature. A peculiar fact, noticed by surgeons is, that polypi are apt to vary much in size at different periods, it being said that they are much smaller in dry than in wet weather.

The treatment of polypi consists in their removal by caustic, the ligature, excision, or extraction. The caustic will generally fail, but when the growth is small and not troublesome, this agent may be tried.

Where the tumor is small, or more particularly where it hangs by a narrow pedicle, the ligature may be preferred, and will be most conveniently applied through a double canula. Much difference of opinion has existed as to the best form of ligature, but the metallic is perhaps generally preferred, and is in most cases the best.

Should the tumor lie high up in a cavity, as of the nose or uterus, and so be difficult to get at, it must be seized as high up as possible by a pair of hooked forceps, and forcible traction must be employed, until all of the polypus thus grasped is torn away. What is left of the growth generally dries up, and sloughs off in a few days.

Where the polypus is so much inclined to bleed, as to render the above method dangerous or inconvenient, removal by torsion may be substituted. This consists in seizing the growth with a pair of forceps, as near its base as possible, and then forcibly twisting it until the part on which the forceps press is thus broken down, and the mass included between the blades comes away. Torsion is often preferred to extraction, because so much less apt to be followed by hemorrhage. Where the polypus is firm, or attached by a broad base, its removal will be best accomplished by the knife, which may also be resorted to in either of the above cases, if preferred.

Perhaps the instrument lately invented by M. Chassaignac, and known as his "écraseur," will be found preferable to either the knife or ligature in the removal of polypi. Indeed, this instrument combines the properties of both knife and ligature. As modified by "M. Charriere," the *écraseur* consists chiefly of an exceedingly blunt chain saw and a metallic stem, surmounted by a handle, to which a screw is attached, and having its lower end slightly expanded and perforated by two grooves. The saw is fixed by one end to the upper part of the stem, is passed downward through one groove at its lower end, then upward through the other groove, and attached by its other extremity to the screw in the handle. When this instrument is used, the part to be removed is caught in the loop formed by the chain below the stem; the screw attached to the handle is then worked, and the saw is so drawn upon the tumor, that it is gradually strangulated, and its fibres are crushed until they are completely severed, when the entire mass comes away. The advantages claimed for this instrument are—that from the manner in which the vessels are divided, the operation is seldom or never followed by hemorrhage, in this respect resembling the ligature; and that, being worked by a screw, a sufficient amount of force may be applied to ensure the removal of even the largest growths in a very short time, generally a few moments only. If experience substantiates these claims, the *écraseur* will undoubtedly form the best agent for the removal of these tumors, as it combines the quickness of the knife with the safety of the ligature; having this advantage over the former, that it is not apt to cause hemorrhage; and over the latter, that it occupies so short a time, and removes the whole tumor at once, and hence leaves no putrifying mass to occasion subsequent discomfort. Indeed, if this instrument is what it is represented to be, it will be invaluable in the removal of all such tumors, as are likely to cause bleeding, or are difficult to be got at with the knife.

The *adipose*, or *fatty tumor*, is soft, grows slowly, is not elastic, gives no pain, and is generally smooth, though sometimes lobulated. These growths most frequently exist about the back and shoulders, and may be either broad and flat with a wide base, large and prominent, or pedunculated. The adipose tumor seldom inflames; and, though it may attain a very large size, it never gives pain. Erichsen mentions a peculiar trait that is, according to Paget, sometimes presented by these growths. It is, that they have been observed suddenly to change their position, gliding as it were for some distance under the skin. *In the treatment* of this tumor, pressure, in the earlier stages, will sometimes effect the cure, and will always produce good: indeed, if constantly applied, a tumor of this nature, even of large size, may be kept stationary for a long time, sometimes for years. Where it becomes desirable, however, to remove the tumor, the knife is the proper remedy. The integuments being drawn tightly over the tumor, a simple incision is made through the skin down to, and extending across the growth, which should then be drawn out and carefully separated from the surrounding structures. This should be done, if possible, by the hand or handle of the scalpel, and when completed, the attachments of the tumor may be divided, and the entire mass removed. The wound must be lightly dressed, and caused to heal by granulation. Where the tumor is very large, a crucial incision may be made, instead of a longitudinal one, but the other steps of the operation are the same. If the tumor is pedunculated, and the pedicle moderately small, a ligature may be used instead of the knife. It will be advisable, however, even in those cases, to divide the skin around the pedicle with the knife, before applying the ligature, as by so doing much time will be gained, and a good deal of suffering prevented. If the bistoury be too much feared to permit its being used, Malgaigne, quoting Sebatier, advises that the ligature be steeped in nitric acid, and then applied. The skin being thus gradually destroyed by the caustic, the ligature is said to give no pain.

The fibro cellular is a soft, elastic, round and circumscribed tumor, growing quickly, but painless, and sometimes found about the scalp, the scrotum and labiæ. After removal, it is found to consist of "a thin capsule, to be of a yellowish color, and to contain a quantity of infiltrated serous fluid." It may be removed at any period of its growth; it never returns; and is said only to occur in adults who enjoy in other respects perfect health.

The Fibrous tumor, though not of very frequent occurrence, is confined to no particular part of the body. Its most frequent seat, however, is the uterus, or the neighborhood of the neck. The fibrous tumor is generally of an irregular, oval, or rounded form; and, though sometimes growing to a very large size, it increases slowly, and gives no pain. Erichsen mentions that tumors of this kind "have been found weighing seventy pounds." Such large tumors, however, are exceedingly rare. They are composed of a ligamentous structure, which, when cut into, presents a white, shining surface. The proper *treatment* is immediate removal by the knife. This should never be postponed; for though a fibrous tumor may for years remain stationary, and give no trouble, yet it is inclined eventually to inflame, ulcerate, and assume a semi-malignant character, after which it may give rise to a fatal cachexy.

Malignant Growths.

The distinguishing characteristic of malignant or cancerous growths, is the peculiar constitutional condition or cachexy with which they are associated. The fact of a tumor returning after removal, or even after repeated operations, is not alone sufficient to stamp it as malignant. It not unfrequently happens that a tumor apparently benign returns after several operations, but is eventually quite cured, the constitution remaining unaffected.

Malignant growths, or those tumors combining the local with a decided constitutional irritation, have been divided into five classes, the *Encephaloid* or soft, the *Scirrhus* or hard, *Melanosis* or black cancer, *Colloid* or gelatinous, and *Epithelial* cancer.

These tumors combine the local and general symptoms characterizing cancers, and also afford to the miscroscopist the *granulated* and *cellular* contents recognized as the *cancer cell.* The grade of malignancy is very much in the same order as that in which the growths have been named.

It will be impossible to do more than treat of these growths generally, as a minute description of each would furnish ample material for an entire volume.

The tendency of all cancers is undoubtedly to the production of death; for although they may for many years remain quite stationery, and cause little or no inconvenience, yet they are prone eventually to inflame, ulcerate, and give rise to a fatal degree of constitutional irritation. In general, however, the rapidity with which the tumor grows will afford a very good criterion by which to judge of its malignancy.

The *Encephaloid*, or most fatal of all cancers, also known as the *medullary*, commences as a small, somewhat hard tumor, generally in some cavity of the face, in the breast, or on the articular surface of a bone: it grows rapidly, and soon becomes soft and elastic. The skin over the tumor first appears traversed by enlarged vessels, then grows dark and livid, and eventually inflames and ulcerates. Soon after this a soft and bleeding fungus shoots through the ulcer; and life is either destroyed by repeated and exhausting hemorrhages, or prolonged by a total removal of the disease, only that the short respite so obtained might give rise to a delusive hope, soon to be blasted by the return of the disease in its original seat, or in some other part of the body.

In some rare cases medullary cancer, in its earlier stage, may be mistaken for aneurism, as pulsation is said sometimes to have been found, and a similar bruit to have existed; but a careful examination will prevent such an error. The *external vascular appearance* of the cancer, and the peculiar *thrills* felt on examining the aneurismal tumor, should be borne in mind, and will prevent a mistake. *The treatment* of this cancer, to be at all hopeful, must be commenced in its earliest stages; for, after, ulceration and the growth of a fungus sets in, the constitution will have been too deeply affected, to be relieved by any means yet known to the profession.

Scirrhus, or hard cancer, is a firm, hard growth, chiefly arising in some of the lymphatic glands, or the female breast; appearing in most cases as a perfectly defined tumor, but sometimes spread out and somewhat diffused, and without any regular outline. When first formed, the growth is but slightly attached to subjacent structures, and is quite moveable beneath the skin; but very soon it excites inflammation, and becomes attached to the surrounding tissues, eventually growing firmly fixed to the skin and underlying structures. The tumor grows slower than in encephaloid cancer, and causes more suffering, being sometimes traversed by a peculiarly severe lancinating pain. Sooner or later the skin becomes drawn in and puckered, or distended and stretched over some part; and it grows vascular, and assumes a livid red, or shining, polished look. A small point, next, softens, gives way, and a small opening is formed, through which exudes a clear, gummy liquid. This liquid drying forms a scab.

Soon after this a thick bloody discharge comes on, and a part of the skin, sloughing away, gives rise to an open ulcer. This ulcer extends rapidly, the edges being ragged and irregular; a constant sanious and fetid discharge is kept up; the pain is greatly augmented; the neighboring glands become affected; and the sufferer is soon relieved by death.

When once the glands in the vicinity become affected, and the cachexy is thus certainly evinced, there can be no hope of affecting a cure by any known means. Cases are mentioned, it is true, in which the disease appears, by exhausting the vital energies of the part whence it grows, to have caused an atrophy thereof, and so render itself stationery. This has been found to occur most frequently among the old. It should be observed, however, that in such cases the tumor has never assumed an active character; it has not ulcerated; and the constitution has never become affected.

Melanosis or *black cancer* is most frequently met with about the eye; though it is not confined to this locality. The tumor derives its name from its dark or black appearance; and this may exist as minute black spots scattered over some space, or as regularly defined, round or ovoid tumors.

In its progress, melanosis resembles very much *medullary cancer*, and gives out a similar fungus after ulceration; the distinction, however, is rendered easy by the color of the growth being almost black, in melanosis.

Colloid or alveolar cancer is a growth consisting of "cells filled with a clear, semi-transparent, yellowish, gelatinous, or honey-like material, resembling indeed exactly a honey-comb. The septa forming these cells are distinctly fibrous and regular in their arrangement." (Erichsen.)

Colloid cancer, though containing the characteristic cancer juice in its cells, and sometimes collecting these in great quantities, can scarcely be called a tumor, as it presents no distinctly defined outline, but is rather an extended mass of disease spread out among the surrounding tissues. It most frequently—nay, almost always—is confined to the viscera.

Epithelial cancer appears to form a connecting link between the malignant and semi-malignant growths. Differing widely from the other forms of cancer, it still possesses so much in common with them, that it can with propriety be treated of only among cancers. This cancer, generally, first appears as a small tubercle, causing little or no trouble, but quickly ulcerating; or in its first stage the ulcer may present itself, small, foul, and unmanageable, and with hard everted edges. The ulcer spreads slowly; and, at first, the disease appears to be local. If unrelieved, however, the constitution, sooner or later, becomes affected, and death results, as in the other forms of cancer.

This disease most frequently occurs about the mouth, lips, face, uterus or scrotum, but is not peculiar to any part of the body.

In the treatment of cancer, various opinions have been entertained with regard to attempting a cure by constitutional means, and much discussion lost on the propriety, or not, of using escharotics, caustics, and stimulating applications to the tumor, at its commencement, and during is progress.

In determining what should be the treatment of cancer, it becomes a matter of the highest importance to decide whether or not the disease be entirely constitutional, or only local, in its nature; or whether it may not combine both constitutional and local causes.

Great difference of opinion on this subject has always existed among surgeons; and even those of the highest standing appear to have entertained rather confused ideas relative to the nature and treatment of cancer. Thus, Sir A. Cooper, soon after stating that medullary cancer "generally occurs to persons who are debilitated, either from intemperance of any kind, or depressing passions of the mind inducing this weakness," gives the highest place in the treatment of such growths to *local means*, placing the highest confidence in *lunar caustic*, and saying that "he had used it successfully in one case of a tumor in the hand, which assumed externally, the appearance of this disease." *In the treatment* of cancer, we are met, at the very outset, by the unfortunate certainty that the disease cannot be cured by any means yet known to the profession; for, although rapid strides have, of late, been made, in the study of cancers, and the phenomena attending them, yet they still continue to baffle the surgeon's skill, and must to-day, as they were three hundred years ago, be regarded as *incurable*. Yet, may we not hope that the day is not far distant when the interest now bestowed upon the study of cancer may be crowned by success, and when, by having gained a thorough knowledge of its nature, characteristics, and symptoms, we may succeed in removing this from the list of opprobriæ by rendering its early detection certain, and its perfect cure easy and sure.

Pressure, caustics, and escharotics have, in turn, been tried, and are still recommended by many; yet these, without exception, will fail. All unite in advising the early and perfect removal of cancerous tumors by the knife, but they will most assuredly return; and the operation is advised and resorted to, rather with a hope of affording temporary relief, than of effecting a cure.

Thus we can only benefit ourselves from the experience of others, by observing that their measures have signally failed, and so turn our investigations into some other channel, and give our attention to other means.

That the development of cancer depends upon some constitutional cause or depravity, can scarcely admit of a doubt. The fact of cases occurring as the result of injuries (as for example, those following a severe blow,) does not at all weaken this position; for there is always a considerable lapse of time between the receipt of the injury and the development of cancer. The appearance of local violence has generally quite disappeared, and the injury may even be forgotten, until the terrible reminder starts up in its site. In such cases, it is very probable that the predisposition existed previously; and that the injury only served to develope it, acting rather as an exciting than as an original cause. How often do we find severe, or even fatal diseases, or the disposition thereto, existing for years without causing difficulty, yet suddenly brought into violent action by some slight exciting cause. He who is peculiarly liable to rheumatism requires only some slight exposure to cause an apparently healthy part to glow with disease, and no one can be blind to the fact, that by care and constant watchfulness one may enjoy perfect health, who, by a single, unfortunate exposure, may so arouse a latent predisposition, as soon to find his lungs a mass of corruption, and himself irrevocably sinking to the tomb. The probability of its being thus with cancers, apparently arising from local causes, is increased by the certainty that if any number of individuals were placed under precisely the same outward circumstances, and subjected, in like manner, to the same injury, cancer would, in all likelihood, not occur in another. Again, cancer will appear as though the result of a blow. As soon as its nature is perceived, and before the glands enlarge, and the system appears affected, the growth is totally and skilfully removed. Were the disease entirely local, and the result of a peculiar injury incurred by a healthy person, we should with reason expect that it return no more. Such, however, is not the fact, as this will occur but once, perhaps, in a thousand cases; the tumor generally returning sooner or later, whether removed by the knife, by caustic, or by any other means. The operation, too, may be performed again and again, and the tumor continues to re-appear after each operation, without the constitution giving any evidence of general disease. If the cancer, then, be of a local origin, of what nature was its cause? At first a blow, then caustic, ligature, or perhaps the keen edge of a surgeon's knife, each of these in turn are followed by it. Surely in such cases there must be some peculiar predisposition lurking in the part; and this can only result from constitutional depravity. The fact, too, of the predisposition to the disease remaining for years dormant, and then suddenly appearing and rapidly destroying, serves only the more plainly to locate it among constitutional diseases; for does not every one of these, without a single exception, present the same peculiarities. It is a fact, too, which cannot be denied, that cancer has frequently appeared to depend on hereditary proclivity. In such cases, then, the disease is certainly constitutional. In every case of cancer in which death results from the disease, a peculiar cachexy is perceived, long before the advent of death. How are we to account for this? It cannot be the result of hectic, arising from local irritation; for it will be found, on examination, only to exist where the disease has pervaded many parts of the system, and so become really constitutional. This cachexy, then, is rather a symptom of a truly constitutional disease, than the result of local irritation. The disease, then, being *ab initio* a constitutional one, there can be no doubt that if the tumor, or local manifestation thereof, be permitted to pass through its several stages of growth, inflammation, and ulceration, it will, by its powerfully irritating effect, increase the constitutional vice; and this becoming greater will exhibit itself more thoroughly, both in its local and general results. Thus the local manifestation of, and constitutional proclivity to the disease react upon each other. Hence the *treatment* should combine both local and general remedies. Either pursued alone must fail. Thus pressure of the tumor, compression, &c., by means of elastic straps, bands, springs, &c., has been, with other local remedies, in turn, recommended, tried and abandoned; and the use of the knife, has so generally failed, that we may be excused for expressing a doubt as to the nature of those growths that have been reported as cancers, cured by the knife alone. Internally, bark, arsenic, and various remedies have been tried; and these, too, have failed.

As soon as a tumor is recognized as cancerous, or where there is a doubt of its innocency, it should be at once removed by the knife, and thus one great cause of irritation will be destroyed. The incisions should pass entirely through healthy structures, and hence be made clear of the tumor. Should the growth return, it should immediately be removed again. In the meantime, the state of the constitution should be carefully observed, and every effort made to produce and preserve a perfectly healthy condition. No particular rule can be laid down, and no remedy, or class of remedies can be named as most efficient. The judgment of each surgeon, in every case that presents itself, must decide whether the tonics, as arsenic, iron, &c., be required or not, and he must act accordingly. One rule, however, may be universally adopted, viz: to remove the tumor as often as it presents itself, and in every case. The object of this is to gain time, remove irritation, and so give the best opportunity to constitutional remedies.

It appears not unlikely, that when the particular nature of each form of cancer is more fully understood, we shall find that each is accompanied by a different, and perhaps characteristic state of the constitution, and so requiring a different class of remedies. This, however, remains to be decided.

To sum up what is required in the treatment of cancers we may say that they should be removed (in their earlier stage if possible,) by the knife, and every exertion made by medicine, by lively, cheerful company, and by the promise of relief, to invigorate and give tone to the physical and moral man. "The blood and bones, and muscles, and all that goes to make up the animal frame, requires to be azotised, to be built up, to be so invigorated by physical, but, perhaps, no less by moral agencies, that it shall be impossible for this defective growth to go on." (Cooke on Cancer in London Lancet, July, 1857.)

The semi-malignant growths may be distinguished from the benign or innocent, by their proneness to return after removal, as well as by the malignant character they sometimes assume, and from the malignant, by their existing only locally, and never giving rise to any constitutional affection, as well as by the possibility of their being cured perfectly, after removal by the knife.

The recurrent fibroid, malignant fibrous, fibro-plastic, cheloid, and cartilaginous tumors belong to this class.

The recurrant fibroid and the malignant fibrous resemble very much, in their general characteristics, the fibrous tumor, their distinguishing trait being their proneness to return after removal.

On making a section of the *sarcomatous or fibro plastic* tumors, they will "cut in a uniform, smooth, and somewhat elastic manner, are semi-transparent, shining and juicy-looking, of a greenish-grey, bluish or pinkish color, often spotted or stained with discolored marks, varying in tint from a blood, to a pinkish, brownish, or livid red hue, which if extensive gives them a fleshy look; their structure is usually brittle. They most commonly occur in young people, without pain and without any known cause." (Erichsen on fibro plastic tumors.)

The *cheloid* is a peculiar rounded, or irregularly oval, slightly elevated, irregular, and flat tumor, appearing to advance over the skin by spreading itself out on every side, and apt to occur from or spring out of old wounds. They present a very peculiar, puckered appearance, very much resembling that of the cicatrix of a burn. Tumors belonging to this class should be removed by the knife as soon as discovered, and if they return, should be removed again and again until a cure is effected.

The *enchondroma* or cartilaginous tumor consists of pure cartilage, and presents itself in two varieties. In the first, the tumor grows slowly, and rarely attains to any size; and this variety is generally regarded as perfectly innocent, while in the second, the tumor grows rapidly, sometimes reaches an enormous size, and is in every respect inclined to assume a malignant character. This form of enchondroma is generally found about the bones of the leg; though it is confined to no part of the body.

The tumor springs generally from the periosteum, and, growing rapidly, presses upon, surrounds, and soon destroys the bone.

Sometimes when large they are said to become soft interiorly, and to have been mistaken for cysts; and again, the skin over their centre sloughing, fistulous openings, discharging a jelly-like liquid, are said sometimes to form. *In the treatment of* these tumors, if they are not attached to the bone, they should be carefully removed by the knife; but where the tumor is fixed to, or springs from the bone, resection or amputation becomes necessary. From the nature of these tumors it is sometimes impossible to decide in a given case, whether the tumor be an innocent or malignant one.

Indeed, so much is this the case, that more than once, surgeons well skilled in diagnosis, and in full practice, have removed large portions, or entire parts of the body, believing them to be the seat of cancer; when, on examining the tumor after removal, it has proved to be an innocent growth. This is unavoidable in some cases, and all that can be done is to examine carefully, availing ourselves of every means of diagnosis, and if we believe the tumor to be malignant, or even semi-malignant in character, we should immediately excise it. If our diagnosis be correct, delay would be dangerous, and if the tumor be innocent, we can only be assured that it will return no more. Before closing our remarks, it may be well to observe that the class of *erectile tumors* has been intentionally omitted in this essay, as they should rather be treated of under a special division. Aneurism especially will be found particularly treated of in the body of this work.

T. S. W.

PART II.

STRUCTURAL AFFECTIONS.

LECTURE XIV.

FRACTURES—CAUSES—PREDISPOSING AND EXCITING—VARIETIES OF FRACTURES—SYMPTOMS.

We propose now to pass to the consideration of the *second division* of the course, which has for its object the discussion of those diseases and accidents which affect the various structures of the body, and in the first place, we shall give our attention to those affecting the OSSEUS STRUCTURES. Under this head we shall first speak of *fracture of bones*, which we define to be *a sudden solution of continuity in a bone, generally produced by external violence.* It is necessary here to study the *causes* of fracture. It may seem to you that we require but little discussion upon the subject. Every one knows that violence applied directly may produce a fracture. This, however, is not sufficient. The surgeon must investigate more minutely. He must take into consideration all those circumstances which may produce a tendency to fracture. We find these existing very differently in different individuals. So much is this the case, that in some persons *muscular contraction* alone is sufficient to produce a fracture. In speaking then of the causes of fracture, we divide them into two classes. First, the predisposing, and secondly, those which we denominate exciting.

What then are the predisposing causes? They are numerous and diversified. And here I would remark, that at all periods of life we are liable to fracture. Even the fœtus in utero is exposed to this accident. As regards the cause of intra-uterine fractures, there is a great difference of opinion. Some suppose the contraction of the wound to be the cause. This, however, is not probable. Others suppose that by the carelessness and rude handling of the accoucheur at birth, these fractures are produced. Now it is probable that violent manipulation at such a time may suffice to produce fracture. I have seen instances of this; but independently of such cases, I would beg leave to remark that you will meet with instances in which no undue violence has been employed. Whenever you meet with such a case as this, you will find, if you scrutinize carefully, that there has generally been some previous osseous affection. But to go on with the consideration of the predisposing causes.

We find that in the other periods of life there is a great difference in the predisposition to fractures. Thus, from 1 to 30, there is no decided predisposition, while from thirty to sixty you will find the greatest number of cases; but this is not at all referable to a predisposing tendency. This is the period of life at which man is most exposed, and that in which his occupations are of the most active character; hence he is most exposed to those various *exciting* causes, of which we shall soon speak more particularly. Again, from 60 to 80, a change takes place in the constituency of the bone. It becomes more fragile, from a preponderance of earthy matter. If then we confined our attention alone to the predisposing causes, we would expect to find the greatest number of cases occurring at this period of life. Statistics, however, prove the reverse; and this may be accounted for by the change which the habits and occupations of men undergo at that time of life. So that, you will perceive, it requires great care to justly estimate the influence to be ascribed to the predisposing causes, referable to the different periods of life; for, if the old were subjected to the same exposure to exciting causes as those in the more active periods of life, I have no hesitation in affirming that *they* would present the greatest proportion of fractures. Again, in considering the predisposing causes of fracture, we must take into account the influence of sex. When we compare the male and female skeleton, we find that the bones of the latter are much slighter, and more fragile, than those of the former; so that, if we confined our attention to this fact, we might conclude that cases of fracture would be of most frequent occurrence in the female; though when we reflect that the female, from her position in civilized society, is less frequently exposed to exciting causes, we will at once perceive the reason for the more frequent occurrence of fractures among males. But among these predisposing causes we have others more important than even age or sex. I mean those modifications of health which change the processes of nutrition and impair the condition of the bones. Such are the various diatheses. They enfeeble the bones by leading to changes in the relative proportions of their constituents, thus rendering them weak and more liable to give way. I may mention as examples of this, the gouty diathesis, the scorbutic, scrofulous, cancerous, &c. Some of these, the latter for example, may so far act upon the bones as to be the cause of spontaneous fractures. Among the predisposing causes I may mention cold, as first considered by Ambrose Pare. It has been supposed that fractures are more frequent in winter than in summer. This, however, is a mere hypothesis, and the reverse has been proved by statistics; which may be accounted for by the fact, that in cold climates, in the winter season, the laboring class is less exposed. There is one way, however, in which cold may tend to increase the number of fractures. Our streets and highways becoming frozen over in winter are very slippery, and thus those walking are liable to fall, resulting in fracture. But here you will perceive cold acts as an *exciting*, and not as a *predisposing* cause.

Let us, next, take a cursory view of the *exciting* causes. We have already mentioned external violence; but, independently of this, in estimating the exciting causes, there is one other of great importance to be taken into consideration. Nearly all the segments of the body are moved by powerful muscles;—and these, acting instinctively on the occurrence of an accident, may concur to produce a fracture, which otherwise would not have taken place. Again, I would remark, that in some individuals, predisposition exists to such a degree, that the mere muscular contraction necessary for turning in bed, has been sufficient to produce a fracture: and should this state exist in the bones of an epileptic patient, it is evident that the violent action of the muscles, during an attack, will be liable to produce fracture:—such cases have occurred.

From the causes, we pass to a consideration of the *varieties* of fractures. They may, in the first place, be *incomplete or complete*. In the first the bone is only broken through a part of its extent; while in the other it is entirely broken through. Of *incomplete* fracture we have various examples; as when in the bones of the head one table remains unbroken. This species of fracture is not, however, confined to the flat bones: it may take place also in the cylindrical. Incomplete fracture may present itself under another aspect: violence applied to the spongy part of a bone may so *dent* it, as to present an incomplete fracture. But decidedly the most interesting of this kind of fracture is one met with in early life, when the bones are still flexible. Violence acting in a transverse direction to the shaft of the bone, may fracture one side and not the other; exactly as you will perceive to take place if you were to bend a green stick across your knee, until the fibres of one side gave way. There is not a complete solution of continuity; and in a case of this kind there will be no deformity except that of angularity. *Complete* fracture, on the other hand, is, as I have said, where the bone is broken directly through. Again; fractures may be divided, with reference to their direction, into *transverse, oblique*, and *longitudinal.* These terms are sufficiently explicit in themselves, and therefore require no explanation. Again; in the flat bones, we may have a *stellated* fracture, or one in which the fissures radiate from a center in various directions; and I may here remark, that *longitudinal* fractures take place generally in the neighborhood of joints, and pass between the condyles. Again; fractures may be divided into *simple, complex*, and *compound.* In the first, we have only a fracture of the bone, without outward laceration of the surrounding parts: in the second, the bone is either broken in several places at once, or several bones are broken at the same time: in the third, there is more or less laceration of, and solution of continuity in the soft parts, with an opening outwards communicating with the seat of fracture, through which one end of the broken bone may protrude. Again, we recognize a variety which we designate *comminuted fracture*—and in which a part of the bone is crushed into fragments; as where a cart wheel passes over a limb resting on a hard surface. Here, too, we may also have a *compound fracture* uniting with the comminuted; when we designate it a *compound comminuted fracture.* Again we divide fractures into *traumatic*, and *spontaneous;* the first arising from external violence; the second from an affection of the bones resulting from the various causes by which it is rendered so fragile as to be unable to resist even muscular contraction. There are various circumstances, too, which serve to complicate a fracture. There may be, accompanying it, a dislocation, or a wound of a blood-vessel,—a very serious complication, leading frequently to the formation of a diffused traumatic anuerism; or the nerves may be involved, producing tetanus, &c.

In the next place, let us consider the *symptoms* and *diagnosis* of fractures: and the latter is of very great importance, as the nature of the injury may sometimes be exceedingly obscure, and especially when taking place in the vicinity of any large joint, where a mistake may produce great evil. I say, then, that the symptoms and diagnosis require mature and deliberate study. Let us see what the symptoms are. They are of various and diverse characters. As to the existence of *pain*, it is a matter of so little importance, that I shall only mention it here: it is plain, that it may attend any injury of the least consequence. Another symptom—and one of great importance—is *deformity*. This is sometimes so palpable, that a mere inspection will be at once sufficient to enable you to recognize a fracture. In other instances, there may be no deformity whatever, and the bone being broken transversely, may even allow of sufficient weight being placed upon it, to enable the patient to walk some distance. This is particularly the case where the fragments are driven violently together, and present a case of what we call *impacted fracture*. Let us see the reasons of this absence of deformity. Sometimes the fragments may be so interlocked, as to prevent any lateral displacement, unless some force be applied in a transverse direction; and from the position of the fragments—resting as they do directly against each other—there can be no longitudinal displacement. Where the bone is thus broken transversely, or directly across, it also retains considerable strength; so much so, as to enable the patient, when the fracture occurs in the leg, to walk some distance. There are, however, other circumstances which may sometimes prevent deformity; as where the fragments are driven, the one directly into the other, or in impacted fracture; and here, if you are not very careful, you may form an incorrect diagnosis. In cases where the fracture is *oblique*, there will be a manifest shortening of the limb; for, by the action of muscles, one fragment will be drawn over the other. That you may discover this shortening, you should place your patient on his back, in such a manner that his shoulders and pelvis shall rest in parallel lines; and then carefully compare each joint on the affected limb, with the corresponding one of the opposite member. For example; if it be a fracture of the leg, having placed the patient as above, bring the heels together, and carefully compare the ankle joints, the patellas, the condyles, &c.; and if these all correspond, you may rest assured that there is no displacement by shortening. I would remark here, that where you find this shortening, you should always inquire if any previous deformity has existed, or you may be led into serious error. Another species of deformity is that which takes place laterally; as where one fragment is drawn inward, and the other outward, or one forward, and the other backward. Where the fracture is superficial, it may easily be detected by drawing the finger along the margin of the bone. Again; as a modification of the lateral, we have a kind of angular displacement, depending on the action of muscles; and—especially in fractures of the lower limbs—we have also a displacement by rotation. Thus, where the femur is fractured high up, owing either to muscular contraction, or to the weight of the foot, you will always find the toes turned either outwards or inwards; and this fracture may lead to a suspicion of dislocation of the hip; as there is in both a displacement by rotation. But decidedly the surest, and most important symptom of fracture is that peculiar grating sound produced by the rubbing together of the rough edges of the bones when any motion is imparted to the limb, and which is known as the *crepitus.* If you be sure that crepitus exists, even though all the other signs be wanting, you may pretty confidently affirm that there is a fracture; though, concerning the reliability of this sign, it is proper for me here to remark, that it presents two possible sources of fallacy. In very old persons, the cartilage may be so worn away as to allow the heads of the bones to grate against each other; and in injuries of the upper extremity where the synovial membrane becomes inflamed, on motion a kind of creaking, or crepitus, is sometimes felt or even heard. To the practiced ear, however, these sounds will be easily distinguished from the crepitus of a fracture. It has been proposed, in these cases, to use the stethescope. I apprehend, however, that no good will be here effected by this instrument; the touch and the ear will be sufficient guides. Be always cautious, however, in making out your diagnosis clearly, and never form your conclusion without a thorough examination.

LECTURE XV.

FRACTURE CONTINUED—PROCESS OF REPAIR—GENERAL PRINCIPLES OF TREATMENT.

The next question to be considered, is the process by which repair is effected in a fractured bone. In examining these specimens, you will perceive a considerable variety in the manner in which consolidation has taken place; and did we not reflect upon the various circumstances of time and place, and the bungling of ignorant surgeons, we might, in some of them, be led to regard nature as rather a bad surgeon.

In the oblique fractures, particularly of the lower extremities, owing to the extreme restlessness, or unwillingness of your patient to submit to the proper treatment, a greater or less degree of deformity nearly always exists. In fact, it is almost impossible for fracture to occur without more or less shortening being the result, except in those cases where the fracture is directly transversed. Where it is oblique, there is nearly always more or less deformity; but, unless this deformity be very great, it is not apt to produce much inconvenience. Now, if we examine a fractured bone after the consolidation has been effected, we find that a hard deposit of calcareous matter has been made, leaving only a slight projection, by which we may recognize the seat of injury. It is necessary that we should thoroughly understand the means by which nature effects the repair, before we can be prepared to direct the measures necessary for the healing of fractures. It may seem strange to you, when you consider the hardness of bone, for me to state, that the process is the same as that by which repair is effected in the soft parts. We find that there is, immediately after the occurrence of a fracture, more or less extravasation of blood into the cellular tissue all around, and also between the periosteum and the bone—forming a coagulum around the seat of fracture. Many—and among them the celebrated John Hunter—have supposed, that under certain circumstances, this coagulum might become organized and be converted into a true callus. I would nevertheless remark, that, notwithstanding the high authority of Hunter, there is no foundation for such an opinion. After a short time this blood is gradually converted into a fluid condition, and is absorbed; thus contributing nothing to the formation of the callus.

But here, as everywhere else in the living tissues, in an exceedingly short time after the wound is inflicted an *effusion of plasma* takes place; and by the time the coagulated blood is entirely removed, all the space between the fragments, between the bone and periostium, and in the surrounding cellular tissue, becomes filled with the plastic elements. By a series of changes, this becomes a blastema; nucleated cells spring up, and increase in number; vessels form in it; it becomes more and more vital, and organized; and, although at first soft and pliable, it soon takes on the character of the surrounding part. This is the first step in the process. But when we follow those changes which take place in the union of fractures—of a cylindrical bone, for example—we find that these changes do not all take place simultaneously. The fatty matter which fills the cells of the medullary canal is absorbed for some distance above and below the seat of fracture; and the cell membrane of the fat globules being highly vascular, plasma is deposited in the medullary canal, in proportion as the fatty matter is absorbed, forming a kind of plug, which fills up the canal. This also takes place between the periosteum and the bone all around. The nature of these deposits soon changes; they become fibrous, and then cartilaginous; which change is afterwards followed by ossification. In the meantime a deposit of plasma also takes place between the extremities of the bones. This goes through all of the same changes, but much more slowly; and it is still soft, even when the others have assumed the character of cartilage. Ossification first appears in that portion of the plasma which surrounds the bones, and that filling up the medullary canal; and then the whole gradually assumes the character of a new osseous mass. That between the fractured ends goes through the same process, but at a later period, and in a slower manner. The first two portions of consolidated plasma have been called by Dupreytren, the *external* and *internal provisional temporary callus*, and the other the *permanent*. The first appears to be a wise provision of nature, to keep the fragments in their proper relations; which, after becoming in a measure unnecessary, is absorbed, and even the medullary canal may be restored, except in oblique fractures. Where such a result obtains, the earthy matter in the cells of the canal is gradually absorbed; and as it is removed, these cells again become filled with their natural, fatty secretions. Thus, then, you see the reason for the provisional and temporary callus. The one serves as a support, until the other, or permanent union, can take place; and when the former is no longer necessary, it is absorbed. I have attempted to give you a plain exposition of this process.

I might give you a number of theories, which have been built up, concerning this subject; but as they have no practical bearing, they would only serve to waste your time. There is, however, one point, concerning which there is a wide difference among pathologists. Some suppose that the cartilaginous deposit is at once transformed into bone; while others suppose that the bone is formed just in proportion as the cartilage is removed,—the latter only serving a temporary purpose. This is still a disputed point; but it has fortunately no practical importance. When fracture takes place in the flat bones, though apparently different, the process of union is essentially the same—though there seems to be no formation of cartilage, the ossific matter being thrown out in the plasma itself.

We go on, in the next place, to a consideration of those principles which are to guide us in the *treatment* of fractures; and here we must always bear in mind, that *nature* is the surgeon, and that our exertions are all to be directed so as to facilitate her operations.

In the management of a fracture, then, there are three leading indications. The first is, to place the fragments in their natural position: this is called the reduction of the fracture. The second is, to support and maintain the fragments in this position; and the third is to combat any complications that may attend. There is, however, an important preliminary indication, of which it is proper that I should speak before considering these. Fractures may take place in localities, in which it will be impossible to treat them; and under these circumstances, the patient must be removed to some convenient and comfortable lodging. Now, as every attempt to move an individual who has met with an accident of this kind is not only attended with great pain, but may be productive of serious evil, it becomes necessary to consider what are the best means for accomplishing this object. The surgeon is thus thrown on his own resources, and must provide such means as shall lessen pain and risk. When a patient is to be moved, there is nothing so convenient as the hands of assistants; and when this method is practicable, a door unhung, a shutter, or a few pieces of boards nailed across two poles, will form a very good carry-all, which may be borne by four persons walking at a steady pace. We thus avoid the jolting of a carriage. It is a matter of importance, too, how your patient is lifted and placed on the carrier. If it be a fracture of the lower limb, and the patient is lying on his back, the left arm of an assistant should be placed beneath the shoulder, and the right under the buttock; and the patient placing his arm around the assistant's neck—the surgeon taking particular charge of the fractured limb—should be lifted directly up, and placed on the litter. I would recommend, however, that, before moving him at all from his position, an attempt be made to reduce the bones, and by some temporary means—sticks, pillows, bundles of straw, &c.—to keep them adjusted; and should you be at a loss for splint cloths, it will, I apprehend, be only in accordance with the dictates of humanity, to throw off your coat, strip off your shirt, and tearing this into pieces, form thus, for the time, splint cloths and bandages which will answer your purpose very well. It may sometimes happen, that from the nature of the roads, the distance, or some other circumstance, this mode of transportation becomes impracticable. If we have not a sufficient number of assistants, we may take two poles of equal length, and sew or nail a blanket across them, with a cross piece at each end. Then, procuring four saddled horses, with the inner stirrups shortened, place the four ends of the poles in these, and the patient, thus suspended, may be conveniently carried for many miles. In short, the ingenuity of the surgeon must always provide for the carrying out of this preliminary indication. We will now return to the leading indications, which, as I have already stated, are three-fold.

So far as the reduction is concerned, I would first say, in general terms, that all necessary arrangements should be made previous to attempting the adjustment of the fragments.

The kind of bed on which the patient is to be put is of importance. A hard mattress is the best; and when the fracture of a limb is to be dressed, the patient should by no means be placed on a soft bed;—the hard floor would be preferable. Having arranged the bed, and placed the patient on it, you proceed to the different steps of adjustment. As the displacement is nearly always caused by the action of muscles, we strive to overcome this, and effect the adjustment by ***extension, counter-extension,*** and ***coaptation.*** The means of fulfilling these indications are of course various. As a general rule, however, we may say, that in the extremities, the extension should take place from the end, and the counter-extension from the body.

By *coaptation* is meant the result of that peculiar manipulation, by which the surgeon brings the points of the broken bones together. Extension and counter-extension sometimes fail to relax the displacing muscles, and emetics, venesection, and chloroform are required. The latter is the best, as it also tends to relieve the pain. Again, in compound fractures, one end may protrude, and you may be unable to return it; when it will be necessary to dilate the opening and force it back to its position. Having performed coaptation, the surgeon is prepared to go on to the second indication, or that of retaining the fragments in their position. The means for doing this are various;—consisting principally, however, of the application of splints and bandages, always filling up any irregularities in the limb with lint. In fulfilling this indication, there is one point which you should always attend to; viz: to avail yourselves of every possible means to overcome the contraction of muscles:—and *position* will aid us greatly in attaining this object. In treating fractures of the extremities, the position of semi-flexion is generally the best; but in particular cases, this rule must be departed from; as, for example, in fracture of the olecranon process, in which case the arm should be permanently, extended; and so likewise with fracture of the Patella. In most other cases the position of flexion is the best. But while I would urge the flexed position in fractures of the extremities, I must state, that I am at variance with many surgeons on this point. Some keep up a permanent extension and counter-extension;—and I have myself sometimes adopted this course; but it is often uncomfortable and unnecessary, and sloughs frequently form at the points of pressure. It is still a disputed point—each may possess advantages, for the just appreciation of which you must use your judgment.

LECTURE XVI.

FRACTURES CONTINUED—BONES OF THE NOSE—MALAR BONE AND ZYGOMATIC ARCH—SUPERIOR MAXILLARY BONE—INFERIOR MAXILLARY BONE.

In entering on the consideration of the particular fractures, it would appear best to begin with those of the bones of the head; but as we will speak of these, when treating of *injuries of the head*, we shall pass immediately to the nose.

Fracture of Bones of Nose.

I would remark that this may sometimes be a serious matter; as it may, by extension to the ethmoid bone, seriously implicate the dura mater, producing inflammation, suppuration, &c., of that membrane. Fortunately, however, this is not of frequent occurrence. But there may arise another complication of a serious nature; from the extreme vascularity of the Schneiderian membrane, dangerous hemorrhage may take place.

In a large proportion of cases, this accident arises from direct injury. There will be no difficulty in the diagnosis. As the bones are superficial, the nature of the accident will be at once perceived, or felt by the finger passed over the nose. According to the nature of the accident, the character of the fracture will be exceedingly various. It may be slight and simple, or it may be highly comminuted. Sometimes there may be little or no displacement; sometimes the fragments may be so driven back, as to produce great deformity; and sometimes the ascending portion of the superior maxillary may be involved, thus injuring or obstructing the nasal duct, and leading to the formation of a lachrymal fistula.

The *treatment* of this fracture is usually of a very simple character. If the bones are depressed, all that we have to do is to introduce a blunt probe into the nostrils, and elevate the fragments; and at the same time, with the fingers on the outside, we arrange and adjust them. In general this will be all that is necessary to be done. In some cases, however, some retentive means will be necessary, in order to prevent deformity. Sometimes strips of adhesive plaster passed over the fragments, will be found sufficient. To afford additional support from within, we might simply plug up the nostrils, were it not that considerable inconvenience would result from this plan: the tongue and mouth, from the continual passage of air over them in respiration, become unpleasantly dry. This may be obviated, however, by the use of hollow tubes surrounded by lint, passed into the nostrils, and there secured with threads passed to the back of the neck. In most cases, this will be sufficient. As regards the hemorrhage which may arise, it may be necessary, if plugging the anterior nostrils and cold applied to the head fail, to plug up also the posterior nostrils. The manner of doing this I shall explain hereafter. It will be sufficient here to say, that with a proper apparatus for the purpose, it may be easily effected. There are some other complications which, however, need not detain us now.

Fractures of the Malar Bone and Zygoma.

In fractures of the malar bone, there is little or no displacement; and the duty of the surgeon is but limited, though the orbit may sometimes be involved; but when force is applied to the zygoma, sufficient to cause a fracture, it may be at the same time driven into the temporal fossa, and produce considerable deformity. Under these circumstances, it becomes the duty of the surgeon to do all in his power to restore the fragments to their proper position. Here the diagnosis is simple and easy: the arch being superficial, the finger passed along its margin will at once detect any deformity, and perceive the crepitus. Owing to the extensive origin of the massetic muscle, there is seldom much displacement either upward or downward; but the greatest deformity is from depression: and here you may expect great difficulty in elevating the fragments of bone. It has been proposed to attempt to place them in position by the finger passed far back in the mouth. I apprehend, however, that you would scarcely be able to reach the fragments by this method. Where we fail by all other means, we are justified in making a small puncture directly over the seat of depression, just large enough to allow the introduction of a small instrument, by which the fragments may be elevated, as in depression of bone in the fracture of the skull; after which it will only be necessary to apply the proper compresses and bandages, to allow no motion of the lower jaw, and to restrict the diet of the patient to liquids. And here I would call your attention to one important circumstance: it is, that violence applied to the zygoma, may extend to the contents of the cranium; and this remark also applies to injuries of the lower jaw; indeed, it occurs there much more frequently.

In the next place I propose to make a few remarks on

Fractures of the Upper Maxillary Bone.

Although upon first sight, this would appear to be a very stout, strong bone; yet, when closely examined, it will be found an exceedingly weak one, the central portion being rendered very thin and attenuated by the large cavity of the antrum. Force, therefore, directed against this bone, may readily produce a fracture; as may, also, a blow directed against the chin from below. It fortunately happens, that, on account of the connection with surrounding parts, there is little or no displacement; and the surgeon will only have to combat the inflammation which may arise. Where the fracture, however, passes through the alveolar process, there being no support below, the fragments descend, bringing with them the teeth to which they are attached. When the fracture takes place a little higher up, from violence directed from the front, one fragment, with the palate and sphenoid bones, may be driven directly backwards, causing a depression of the face, and sometimes producing an obstruction in respiration and deglutition. It is very difficult in cases of this kind to adjust, and maintain the fragments in apposition. Some have proposed to pass a hooked instrument behind the palate bone, and draw the whole forwards at once. For keeping the parts in apposition, you may use an instrument, slightly modifying it for this purpose, which I shall presently present to you when speaking of fracture of the lower jaw. It fortunately happens, that we may, in many cases of this kind, use the lower jaw as a splint: but, where the fragments are small and numerous, we may secure them by attaching the teeth they contain, to the neighboring ones, by means of wires. It may happen, however, that this is inexpedient; for there may be no teeth, or the wire may cause irritation and inflammation of the gums; and here the instrument already alluded to may be used. But in cases of fracture of the superior maxillary bone, there will be little or no displacement, and no difficulty in the treatment.

Fracture of Lower Jaw.

From its manner of articulation, figure, and exposed situation, the lower jaw is very liable to fractures, which may occur in various manners, and in various positions. In this bone, we are apt to find *multiplex* fractures. The bone may be broken on opposite sides, or in different places on the same side. The fracture generally is oblique, except at the syphysis, where it usually passes vertically through the central line. This bone may be fractured through the symphysis, through the body, the angle, the neck, or through either of its processes: and the whole alveolar process may be broken off, or only portions of it.

As regards the diagnosis, there will be no difficulty. The bone being superficial in nearly its whole extent, the fracture may be felt by passing the finger along its lower border; and should there be any difficulty, by passing the finger in the mouth, and along the range of the teeth, any displacement will be felt; and, on motion, crepitus will be perceived. Where the fracture is in the *neck*, it may be detected by passing the thumbs into the mouth, and, with the aid of the fingers outside, seizing the jaw, and moving it forwards and backwards, and from side to side. The great mobility of the fractured side, will point out the seat of injury. We find that sometimes in fracture of the neck, the upper fragment being drawn inward by the External Pterygoid muscle, we fail to perceive crepitus. But the great motion existing in a forward direction, the depression found under the zygoma, and the fragment, felt by carrying the finger far back into the mouth, will all serve to point out the nature of the accident. The *prognosis* is as various as the nature of the accident, differing according to the extent of the injury, and the nature of the complications which may exist. In oblique fracture through the body, the obliquity is generally so directed, as to cause the posterior fragment to ride over the anterior. The *adjustment* of the fragments is generally easy. By means of the thumb passed into the mouth, and the fingers acting outside, the fragments can be pressed into place; and using the upper jaw as a splint, the proper bandages and compresses, for retaining the fragments and preventing motion, should be applied, and perfect quiet enjoined. The apparatus for retention are innumerable. I shall not enter into a detail of the merits of all, but shall content myself with showing you a few of the most useful In the first place, I have found very convenient, a pasteboard splint moulded to fit the jaw, such as is here exhibited, and which is retained by either a roller, or a four tailed bandage. If the roller be determined on, it may be applied in one of two ways. Taking a roller bandage, make one or two vertical turns beneath the chin, one or two horizontal ones around the forehead, and one or two horizontally over the chin ; or, starting with the end of the bandage over the occiput, bring it obliquely over the head and forehead, beneath the chin, up over the forehead, obliquely across the head, to the original point, and several times around the chin, and so on. If the four tailed bandage be preferred, the lower strips may be carried up over the head and secured, and the upper carried back and secured behind the head. In all cases the food must be of a liquid character, as no mastication can be allowed.

Where the bone is very much comminuted, a very good apparatus is one invented by Dr. Bennett, of this city. You see it here before you. It is quite simple, and requires no particular description. In some cases, however, even this will not succeed. You may then use an apparatus such as you see here. It consists, as you perceive, of a horizontal piece moulded to support the lower jaw, and two side pieces to confine it laterally. The centre of the horizontal plate projects, as a female screw, in which a male screw works, the latter supporting and moving a semi-circular piece of steel, ground to fit the teeth. This may be removed, and in its stead smaller segments of steel put in, so as to act on one or both sides of the jaw as desired. Where fracture of the *condyles* takes place, no adjustment can be made from without, but the mouth being widely opened, and a cork placed between the teeth, you may pass the fingers into the mouth far back, and, pushing out the posterior fragment, press the anterior one firmly back, so as to engage the rough ends in contact. Then, keeping them so, elevate the jaw, and retain the fragments by some of the means already pointed out.

LECTURE XVII.

FRACTURES CONTINUED—OF THE VERTEBRÆ—OF THE CLAVICLE.

We propose this morning, gentlemen, to commence the consideration of fractures of the *vertebræ.* When you consider the form of the vertibræ—that they are constituted, in the first place, of a body, and secondly, of various processes springing from this body; and especially when you consider the relations of these parts with the spinal cord and its membranes, you will at once see that fractures of the vertebræ may be of great importance, and may even endanger the life of the patient.

In the first place, it will be convenient to consider fractures of the *spinous processes*. These, as you are aware, project backward to form levers for the attachment of muscles. Now, when these processes are broken off, and the injury does not extend sufficiently deep to involve the arch, the accident is not of serious import, as it is not associated with injury of the spinal cord or any other important structures. When direct violence is applied to the back, one or more of these processes may be broken off and even driven considerably out of place. When this has taken place, inspection, pressure by the finger along the vertebral column, and proper manipulations, will scarcely ever fail to afford the grounds for a correct diagnosis. The process may be depressed, displaced laterally, or even elevated. Of course where *many* of the processes are fractured, owing to the insertion of the muscles, any motion in the part may give pain. In the *treatment* there is very little to be done. If they are displaced sideways, or elevated, all that we can do in the way of adjustment is to press them back to their places, apply a compress along the sides of the vertebræ, securing it by a proper bandage, and enjoin quiet on the part of the patient, keeping him on his back, to relax the muscles. Fractures of the *transverse processes* are of less frequent occurrence, from their less exposed position, and also from the fact that in the dorsal region the ribs lessen their liability to fracture. The accident, when it does occur, is difficult to detect, and the *treatment* would differ in no respect from that already spoken of for the previously mentioned accident. You are aware that besides the processes already mentioned, we have, inclosing the spinal cord, a bony roof called the *arch*. Now here we have a very different thing to deal with. The fracture of the arch itself is not of any importance, but the injury to the spinal cord and membranes constitutes the danger of the accident. It is always to be regarded a serious one; so much so, indeed, that sooner or later, never mind how careful you may have been, the time will come when symptoms of inflammation of the spinal cord and its membranes will present themselves, and then follow loss of power below the seat of injury, convulsions, depression of the vital powers, loss of sensation and death; and all this may happen without even a depression of the bone. Depression, however, may take place, and then the results, I mean the immediate results, will differ widely, according to the seat of injury. Here, for the purposes of arrangement, I would beg you to recall the anatomical division of the vertebræ into *cervical*, *dorsal*, and *lumbar*. Now, when a fracture takes place in the *cervical* vertebræ, and the injury extends to the cord, instant death is, nearly always, the result. A good anatomical and physiological reason may be given for this. As the *phrenic nerve* takes its origin from this part of the spinal marrow, and as this nerve is essential to the function of respiration, any cause cutting off its communication with the nervous centre, produces death by asphyxia. In this connection I would also state to you, that, besides the phrenic, there are other nerves taking their origin from this part, and going to supply muscles of respiration, which would also be implicated. I say, then, that whenever fracture takes place above these origins, with injury of the cord, immediate death will be the result. But when the fracture occurs in the *lower cervical*, or *dorsal vertebræ*, involving the cord in the injury, although of a very serious character, it is not so immediately fatal as the same accident taking place higher up. The nerves, whose communication with the nervous centre is thus cut off, not being of such vital importance, the patient may survive for several days, weeks or months; and he may even escape with his life. On the whole, I may remark, that as we descend the spinal column, we find that the danger resulting from fracture grows less, since the nerves affected become less in number. But when we consider fractures in the dorsal region, there is one circumstance which bears strongly upon the result. I allude to the greater liability of the cord to undergo compression,—a result attributable to the comparatively small size of the canal. When we come to consider the column as a whole, we find that in the neck the opening is large; and, consequently, in fracture here there is less injury done to the cord. In the dorsal region the canal is so small, that a very slight displacement may encroach upon it so much, as to give rise to serious results. Again, when we arrive at the lumbar region, owing to the great mobility of the parts, the canal grows larger, and there is less liability to compression; and here, though the fracture is still serious, it is much less so than that taking place in the back or neck. Below the second lumbar vertebræ, there being only the cauda equina exposed to injury, the result is still less serious: and again, in fracture through the false vertebræ, where there are only nerves exposed, the danger is less than anywhere else. In fractures of the *atlas*, or of the processus dentatus of the axis, the head will immediately fall forward on the chest, owing to the rupture of the transverse ligament; and the cord being thus encroached upon, instantaneous death will be the result. I apprehend you will never be called upon to treat such a case. But where the fracture takes place lower down, the phrenic nerve not being affected, it may sometimes be in your power to afford some comfort to your patient, though you cannot expect to save his life. Before I proceed, allow me to remark, that you must still consider my remarks as referring to fracture occurring through the arches. The effect of this injury is not confined to the muscular system, but extends also to the internal organs. We have already seen that one of its results consists in total loss of voluntary motion in those parts supplied by the nerves which take their origin below the seat of fracture; but this paralysis of the voluntary muscles is by no means so important as that which takes place in the internal organs. The bladder becomes apparently a lifeless bag, and the patient, suffering no pain from its distention by urine, does not complain, while it may gradually enlarge, producing a rounded tumor in the hypogastrium, and increasing in size, until sometimes it may even reach the umbilicus. Finally, it gives way, and the patient is rapidly destroyed by peritonitis. This fact you should always bear in mind; and when treating injuries of the spine, you should always watch the bladder, remembering that it cannot help itself. Similar effects are sometimes seen in other internal organs. Paralysis of the coats of the alimentary canal may take place, rendering it insusceptible to ordinary impressions. All peristaltic action will cease; costiveness, distention and softening will result; and ultimately rupture may occur, as in the bladder, and with the same results. But to return to fracture of the arches. Where this is associated with depression, it will be the duty of the surgeon, in many cases, to attempt to elevate the depressed parts to their proper position. This, however, for the want of proper leverage, is unfortunately very difficult; though it sometimes happens that the depression is slight, and careful manipulation is all that is necessary to restore the parts. When the depression is great, and there is paralysis, it has been proposed—first by Mr. Cline—to cut down, and with a Hey's saw, divide the arches, and elevate the fragments, just as in fracture of the cranial bones. But although this practice is founded upon very good principles, death has always resulted; notwithstanding the *operation* was skilfully performed. I apprehend, therefore, that the practice is unjustifiable;

for, even if the operation is successfully performed, it is highly probable that your patient will be destroyed by inflammation of the cord, or its membranes. If, therefore, you cannot, by manipulation, succeed in replacing the bone, no good will be derived from cutting into the canal and laying bare the cord and its membranes.

Besides fracture of the processes and arches, we may also have fractures taking place through the *bodies* of the vertebræ. These fractures may be either *vertical* or *oblique*. Every case which has come under my notice has proved fatal. You will find that the degree of displacement is various—depending on the location of the accident and the force producing it. In the *cervical* region, owing to the great mobility of the part, there is greater displacement than in the dorsal or in the lumbar region. This accident is scarcely less serious than fractures through the arches, and is followed by the same train of symptoms. Here the duties of the surgeon are two-fold: the first, and least important, relates to the *adjustment* and *retention*; the second to the treatment of the effects resulting from the injury; and this is the most important of the two. As far as the measures for the adjustment of the fracture are concerned, surgeons differ widely. Some advise that no attempt be made at reduction, because of the danger of destroying the patient by pressure on the cord. There is, I admit, much truth in this; and you will easily infer from what I have said, that a slight change of position in the parts may cause a fatal encroachment upon the cord. But while this may be true, I apprehend that there are cases in which you might, with safety, remove the deformity, or at least prevent any further displacement. The patient should always be placed straight on his back, on a *hard* mattrass; and it has been proposed to prevent deformity, by gradually elongating the vertebral column by counter-extension from beneath the arms, and extension from the foot; thus carefully reducing the fracture, and preventing further displacement. Some cases of fracture of the bodies of the vertebræ may be treated in this way. I, however, have never felt myself to be justified in the adoption of this course, but have mostly relied on position and general treatment.

As regards fractures of the *sacrum*, we must remember that we here have, passing through this bone, those nerves which constitute the sacral plexus, and that these may be involved in the injury. The effects, then, resulting from a fracture of the sacrum are various; and from its position and connection with the ossa inominata, and also from the important part it takes in the formation of the pelvic cavity, its reduction is of the highest importance. The fracture may be ***transverse***, ***oblique***, or through either wing. When taking place high up, crepitus may be detected by motion of the lower limbs; if lower down, the seat of injury may generally be discovered by the touch; but where there is doubt, it becomes sometimes necessary to pass the oiled index up the rectum, in order to discover the seat of injury. Having ascertained the position in which there is least displacement, place your patient on his back, and apply such compresses and bandages as may best retain the fragments in that situation.

The next subject to engage your attention is one which has excited great interest, and has given rise to a greater display of the ingenuity of man, than any other fracture to which the human body is exposed. Though not in itself of much importance, yet from the deformity which is apt to result, and the subsequent inconvenience to which it may give rise, this accident has attracted a great share of attention. I allude to

Fractures of the Clavicle.

It becomes necessary, in order to understand fractures of this bone, that we should remember its connection with the several muscles attached to it. Dividing the bone into two halves, on the ***sternal*** half, we have nothing to antagonize the ***pectoralis major*** butthe clavicular portion of the ***sterno-cleido mastoideus;*** while, on the ***acromial*** half, we find the ***trapezius*** antagonizing the ***deltoid***, and added to these, we have the ***conoid*** and ***trepezoid ligaments.*** Thus we can understand, that the amount of displacement will depend greatly upon the position of the fracture, being much greater when it occurs in the sternal, than when in the acromial half. But suppose a fracture to have taken place; let us see what symptoms will present themselves. The arm falling, will, by its weight draw the shoulder downwards and forwards; and the bone being superficial, the fracture will be easily detected by the finger passed along its upper border. If the shoulder is lifted upward and backward, the deformity is at once removed; but it returns as soon as the arm is let go,—the patient being also unable to carry his hand to his head. The fracture once discovered, let us next consider the means by which it is to be reduced, and the fragments retained in position. These, however, are of such a diversified character, and will occupy so much time, that I will defer the consideration of them to the next Lecture.

LECTURE XVIII.

FRACTURE OF CLAVICLE CONTINUED—OF SCAPULA—OF ITS BODY—ACROMION PROCESS—CORACOID PROCESS—FRACTURE OF THE HUMERUS.

In our Lecture yesterday, you will remember that we were speaking of fracture of the clavicle. It is important that you should understand the leading indications to be fulfilled in the treatment of this accident. These are two in number: first, to carry the shoulder upward and backward; second, to keep the arm up and out from the body. You will find among surgical writers, a great variety of means proposed for fulfilling these indications. There is no fracture of the body in which a greater number of apparatus has been used. I will not stop here to pass each under review; but would only remark (and this will apply to all fractures,) that the apparatus which combines simplicity with efficiency, is the best: and in the clavicle, especially, are these complicated appliances unnecessary. I have succeeded as well with merely two or three handkerchiefs, as with the most complicated arrangement of pads and bandages. I shall, however, proceed to point out a few of these methods. As long ago as the time of Ambrose Paré, the method of putting up fractured clavicle simply by a figure-of-eight bandage was in vogue. This plan consists simply of a few turns of a roller, passing from the axilla of the opposite side, over the shoulder, under the arm, over the other shoulder, and so on; thus drawing the shoulder up and back. Some have also proposed that a common long splint be applied across the back, and be secured there by a few turns of a roller. This plan is sometimes very efficient; but I generally use only two common silk handkerchiefs folded cravat-like, with cotton in the center, to prevent their bruising. The ends of each having been knotted, pass one of the handkerchiefs over each shoulder, and bring the knotted ends tightly together behind, using, at the same time, a pad in the axilla, and a bandage to keep the arm to the side. As the bandage of Dessault is generally mentioned in your works on fracture, although I do not approve of so complicated an apparatus, yet I deem it my duty to explain to you the method of its application. The fracture being reduced, as I have already explained, the pad is placed in the axilla, and secured there by carrying two straps attached to its larger and upper end, one in front, the other behind, over the opposite shoulder, crossing under the axilla, around the thorax, and secured by a knot over the lower end of the pad. Then secure the arm to the side by circular turns of a roller around the chest and arm, from the elbow to the shoulder. This is the first bandage. The second consists of a bandage passing from the axilla of the sound side, obliquely across the chest in front, over the affected shoulder, behind the arm to the upper portion of the fore-arm, which is flexed upon the arm, then obliquely across the chest, under the axilla of the sound side, rising obliquely over the back to the shoulder of the affected side, descending in front of the arm, under the fore-arm, and rising obliquely over the back to the axilla of the sound side, and so on for three layers,—the whole being secured by a few circular turns around the body. This adjustment is sufficiently efficacious; but, occupying the greater part of the thorax, it embarrasses respiration, leaving the whole process to be conducted by the diaphragm. In asthmatic patients, then, it will be impossible to resort to it. Owing to this defect in Dessault's apparatus, it has been variously modified. The first of these modifications which I shall bring to your notice, is that by Velpeau, which is known as Velpeau's Bandage. It is thus applied. The hand of the fractured side is placed upon the shoulder of the opposite side, and then secured by a bandage passing from the axilla of the sound side, diagonally over the shoulder of the affected side, and horizontally round the body, this being repeated as often as necessary; and over this is applied, in the same manner, a second roller, which has been previously moistened with dextrine or starch. This plan, however, I find not less uncomfortable than that of Dessault. You will readily perceive, that the position of the arm—constantly resting across the chest—must be very uncomfortable. Whilst, then, I mention this plan, I shall not recommend it. You may resort to this method in fracture of the coracoid process, or the neck of the scapula. By these means, carefully adopted, you will generally be able to turn out cases of fractured clavicle with but little of that deformity which is usually so much feared. On young children, and in adults upon whom you may rely, nothing is necessary beyond the most simple application,—a pad placed in the axilla, the arm bandaged to the body, and the head placed in a sling.

We have in the next place to consider

Fractures of the Scapula.

These may occur in the *body*, *neck*, or *processes*. The *body* may be broken in various places; even its spine may be fractured. When the fracture takes place in any portion of the body, owing to the insertion of the strong muscles of the part, there will seldom be much displacement; but by motion of the arm the fragments may be detected.

The *treatment* of this accident is a very simple affair. By moving the arm you are to ascertain the position in which the fragments are best adjusted; and retain it in that position. All that will then be necessary is to press the fragments into coaptation, and retain them by a roller bandage, the arm being at the same time confined to the side, and the scapula pressed firmly against the body by a roller passing from the opposite axilla over the back and shoulder and under the axilla of the affected side, up over this shoulder and across the chest to the first point, and so on for several turns.

Fracture of the *neck* of the scapula is a matter of much more importance. Here the arm falls downward, and its motion is very much impaired. There is a depression of the shoulder, which may be removed by elevating the arm, but which returns upon letting it fall; and by motion of the arm, when elevated, crepitus may be perceived both by hearing and by feeling. For the *treatment* of fractures of the neck of the scapula, a variety of means has been adopted. It is clear that the first indication is to raise the arm, and thus place the fragments in contiguity, and next to keep it in that position. To secure these indications, a wedged shape pad should be placed in the axilla, the apex being turned upward, and the arm firmly secured to the body; for which purposes the bandage of Dessault, or that of Velpeau, may be used. There is, however, an expedient which I would recommend to you. It is to use a pasteboard splint ending in two strips, which are made to cross each other, the one passing over the scapula and the other over the clavicle, the remaining part lying on the arm, and being secured by a spica bandage. Then, placing the arm by the side and flexing the fore-arm, apply Dessault's second bandage, as already described. You will find this plan well adapted to fulfil the indications in view.

We proceed now to fractures through the processes, and the first which shall engage our attention is that taking place through the *acromion* process. As the deltoid muscle takes its origin from this process, it follows that it will be drawn down, and there will be an inability to elevate the arm from the side. When there is any doubt, however, the finger, being passed along the spine, will easily detect the abrupt termination of the fractured bone. A great difficulty is supposed to exist in the treatment of this fracture, and I am free to confess that this, in some instances, may be true. Sometimes only a ligamentous union will take place; but in these cases, I apprehend that something must be wrong. I would suggest, in the first place, that you should carry the arm out from the side, so as to relax the deltoid muscle; and then pressing the outer fragment firmly in with the thumb, you must simultaneously push the arm upward and inward towards the body, and retain it in that position. For this purpose I would again recommend the pasteboard splint, as already advised in the treatment of fracture through the neck of the scapula. The arm is to be kept to the side, and Dessault's second bandage to be applied, in the same manner as in that fracture. Owing to the difficulty of treating this fracture, some have proposed to keep the arm permanently in a flexed position, by means of an angular splint at the elbow secured to the arm and body by a roller bandage, which is afterwards carried over the point of the shoulder to keep the fragments, with the aid of compresses, in apposition. Either of these methods may be adopted.

I must now speak of fractures of the *coracoid process*. This process is sometimes broken off; and then it will be drawn downwards and inwards, by three muscles, the *pectoralis minor coraco-brachialis*, and *short head* of the *biceps*. Sometimes, owing to the depth of the process and its being covered by the *pectoralis major*, the fracture will be difficult to detect, and also difficult to reduce. But still it will be your duty to attempt to put the fragments in apposition, or as nearly so as possible; and I apprehend that the best way of effecting this will be to place the hand over the opposite shoulder, as in the position for Velpeau's bandage, and applying a graduated compress to the process, to secure it by Velpeau's bandage.

Next we go on to speak of

Fractures of the Humerus.

This is, as you know, a cylindrical bone, presenting various parts, interesting in a surgical, as well as in an anatomical point of view. In the first place, we have the *head*; beneath this, and separating it from the rest of the bone, is a constricted portion, called the *anatomical neck;* below, between this point and the insertion of the *latissimus dorsi* and *pectoralis major*, is the portion known as the *surgical neck;* and this last must not be confounded with the *anatomical* neck. Next to this is the shaft of the bone, and then the inferior head, consisting of the two condyles, and the trochlea. Through any of these sections a fracture may take place, and it is necessary to consider each separately—first, fracture as occurring *in the anatomical neck;* secondly, in the *surgical* neck; thirdly, in the *shaft*; fourthly in the shaft *above* and *near* the condyles; and fifthly, *through* the condyles themselves. It is important to bear this division always in your mind.

Now then, we will consider *fractures through the anatomical neck.* It is proper to remark, in the first place, that in young subjects—indeed up to the fifteenth year—the head of the humerus is attached to the body only by a cartilagenous substance, which occupies the position of the anatomical neck, and the head may here be separated from the bone; though this fracture deserves to be considered also in another point of view. Should the fracture take place *within the capsular ligament*, the head floats every where in the synovial fluid; resting as a foreign body in the joint, it excites inflammation, which progresses to suppuration; and unless timely aid is afforded, the unfortunate victim may perish, from the extent to which the inflammatory action is carried. But in other instances the fracture may take place *exterior to the capsular ligament;* and here the accident is of a far less serious character, for life in the fragments may still be kept up; even a reparative process may in a measure take place; and we may have at least a ligamentous union. These fractures are generally caused by force acting in the axis of the limb; as, for example, by falling from a height and catching on the hand. Force, acting in this manner, may not only detach the head from the neck, but may also cause a fracture through the head itself, thus producing a multiplex fracture.

Again, we should discuss fractures occurring in that portion of the bone known as the *surgical neck*, or all that part of the bone lying between the anatomical neck, and the insertions of the pectoralis major and latissimus dorsi; but as this will occupy too much time for the present lecture, I shall resume the subject at our next meeting.

LECTURE XIX.

FRACTURES OF HUMERUS CONTINUED—FRACTURES OF BONES OF FORE-ARM—OLECRANON PROCESS—CORONOID PROCESS.

I have remarked to you, gentlemen, that it was highly important, in a consideration of fractures of the humerus, to distinguish between those that take place in the surgical neck, or that portion of the bone which lies between the anatomical neck, and the insertion of the latissimus dorsi and pectoralis major, and those which take place below the insertion of these muscles. We find that by the action of these two muscles, with that of the *teres major*, the arm is drawn to the side; so that, when fracture takes place above their insertion, the lower fragment will be drawn inward, towards the side. But this is not all. Inserted into the greater tuberosity of the humerus, we have the *supra* and *infra spinatus* muscles. The influence of these two muscles will be exerted on the upper fragment, and, by a rotatory movement in the glenoid cavity, cause it to glide outward over the lower. Now let us contrast what takes place here, with what would take place if the fracture were lower down. When the fracture occurs below the insertion of these muscles, the influence of their contraction would be exerted on the upper fragment, drawing it in, and thus causing the lower fragment to glide out, and over the upper one. This then is the difference between fractures occurring in the surgical neck, or above it, and those occurring below it. In the one, the upper fragment glides outward and over the lower, the lower being drawn inward; in the other, on the contrary, the lower glides outward, over the upper, the *upper* being drawn inward. This distinction should always be borne in mind, as it will have an important practical bearing.

For the *treatment* of those fractures occurring through the surgical neck, or above it, a number of expedients may be resorted to. For example; after the adjustment and application of the tumefaction bandage, two or more splints may be put on, surrounding the arm, always taking care to introduce compresses under the splints, to prevent injury to the soft parts. These splints are to be secured by a roller bandage; and it is also advisable to apply a few turns of the roller, in the form of a spica bandage, over the shoulder. The arm is then brought to the side, a pad being placed in the axilla. Another plan is that of using an angular trough paste-board splint, placed at any angle, the right angle being the best. Having placed proper compresses in the splint, and made the proper adjustment, apply first the tumefaction bandage, commencing at the hand, and proceeding upward; and having arrived at the seat of fracture, it would be best to introduce an additional compress, and apply the bandage a little tighter. The upper end of the splint is to be curved in such a manner as to adapt itself to the shoulder; and it is then to be applied, and secured by bringing the roller down over it. If the splint is a rectangular one, the arm may be laid across the chest; and then precisely the same steps are pursued, as in the application of two or four splints. Soft compresses are introduced; the apparatus is secured by a roller; and the arm is brought across the chest and suspended in a sling. Again; when the fracture is very low down, a *hinged* splint may be used, the angle of which is regulated by a screw; and this is to be secured as the previous. And I would remark, before leaving the consideration of fractures of this kind, that displacement here is not so great, on account of the muscula fibres of the brachialis anticus, which take their origin from the bone, and form strong bonds of union, keeping the fragments in their places.

I have said that fractures, both oblique and transverse, might take place *near the condyles*, so as sometimes to affect the joint. This is a very difficult fracture to manage. When low down, it passes through the fossa magna, and produces inflammation of the synovial membrane. If we are not very careful, therefore, we shall have the accident to result in *anchylosis;* while on the other hand, also, the tendency to *displacement* is constant. The difficulty, then, is two-fold. In this form of fracture, the diagnosis is very easy. Even when the arm rests by the side, the deformity is evident; but if you lay hold of the arm with one hand, and the upper part of fore-arm with the other, and move the one on the other, crepitus will be plainly perceived. Still, when you have discovered the existence of the fracture, it is necessary to push your examination one step further; for it is very frequently confounded with fracture involving the condyles only; and indeed these are sometimes of simultaneous occurrence. When the latter takes place, you find that upon seizing the arm and fore-arm, as before, the elbow when flexed will be very broad. By the absence of this increase of width in the elbow, and from crepitus, and the mobility in the part, you will be enabled to distinguish a fracture above the condyles.

As regards the *treatment,* you will observe, that the method of managing fractures higher up will not do here, the lower fragment being too short to be controlled by this plan. The best application is a trough paste-board splint, one segment of which is to act upon the arm, and the other on the lower portion of the arm and fore-arm. A variety of expedients, however, have been suggested for the treatment of this fracture. A very good method is to use simple angular splints, with compresses interposed; the splint being confined by a roller bandage also, and the arm being kept in a flexed position; while the tumefaction bandage should have been previously applied.

I have already alluded to fractures occurring through the *condyles*. It sometimes happens, that small fragments of the internal condyle are broken off, without the fracture entering the articulation. In this accident, there is seldom much displacement. The arm being flexed, you can easily press the small fragment into its position. Having done this, apply a compress before, behind, and below; and pass a common roller round the limb, from the hand to the elbow, where you should make several figure-of-eight turns, the arm being placed in a flexed position. It is seldom necessary to use any splint.

But when the fracture extends more deeply, and the inner or outer condyle is broken off from the rest of the bone, we have to deal with a far more serious accident; for here the synovial membrane will be implicated, and in the process of cure, your patient will not only suffer great pain, but plasma may be thrown out, into the joint; and, unless care be taken, he may come out with a permanent anchylosis of the elbow, a matter of the most serious importance. There are, then, two leading objects to be kept in view, in this connection; first, to secure the condyle in its proper position, and secondly, to prevent anchylosis. We find, on reflection, that every consideration suggests the flexed position of the fore-arm on the arm, as the best to be selected for the treatment of this fracture. When it is possible, the hinged splint may be used: and it is best always to begin with the fore-arm at a right angle; and gradually to change its position, as the case advances; the object of this being to break up any bonds of union which may, from time to time, form in the joint; and thus to prevent the development of anchylosis. Having made the proper adjustment, and flexed the fore-arm on the arm, the tumefaction bandage should be applied from the wrist upward. Having arrived at the elbow make a few figure-of-eight turns; then ascend with the roller up to the shoulder; place a compress between the splint and the anterior portion of the arm; and then, with the same roller, or another, descend over the splint, making again several figure-of-eight turns at the elbow, and continuing the bandage to the wrist. Lay the arm, lastly, on the chest, and support it in a sling. This apparatus should be worn for about a week or ten days; at the end of which time, it should be removed, and the arm carefully flexed and extended gently, and redressed; being then careful to replace it at a different angle. If great inflammation be present, however, it will be highly improper to put on any apparatus whatever, before this has subsided. While carrying out the antiphlogistic treatment, the patient should be kept upon his back, and perfectly quiet; and should tumefaction arise, even after the splint has been applied, it should at once be taken off, and all the dressing should be removed. Great care will be required in the treatment of these cases; and I have pointed out that plan which I regard as the best. I would remark, however, in this connection, that some use two angular splints, one on the inner, the other on the outer side of the arm, and applied in the manner described above. This method I do not consider as good as the other; since it does not so completely prevent motion at the elbow.

With these remarks, I conclude what I have to say on fractures of the humerus, and shall go on, in the next place, to consider fractures occurring in the

Bones of the Fore-arm.

The first of these of which we shall speak, is fracture of the *olecranon process.* This may be caused by either direct, or indirect violence; and it may be *transverse* or *oblique*. Generally the displacement will be great, from the contraction of the triceps muscle carrying the fragment up, on the arm; there will be a depression at the joint, where the process ought naturally to be found; there will be, on the part of the patient, a total inability to extend the fore-arm; and, except where there is great tumefaction—which is apt to occur soon—there will be no difficulty in detecting the nature of the accident. Where there is tumefaction, by moving the fore-arm on the arm, the diagnosis may be easily made out.

Let us now see what are the indications to be fulfilled in the *treatment* of this fracture. In the first place, as the fragment is carried upward by the triceps muscle, it is clearly indicated, that this fracture should be treated with the arm in the extended position; and therefore it is of importance to use in the adjustment, such means and appliances, as shall keep the arm in extension. The next indication is, to counteract the action of the triceps muscle. A good method is, after having applied the tumefaction bandage, to use what is called a *uniting bandage.* Carrying the tumefaction bandage as far as just below the elbow, and having provided ourselves with two strips of linen, we place one on the inner, the other on the outer side of the arm, and secure them there by a few turns of the roller. We then apply a compress above the fragment, make a few figure-of-eight turns, and continue the bandage up over the strips. Then, keeping the arm extended, we tie the strips of the uniting bandage, apply a splint to the front of the arm and fore-arm, and secure it by bringing the same or another roller down over it. I would here also remark, that this fracture is in connection with the joint; and therefore, as in fracture through the condyles, great care must be taken to prevent anchylosis. In spite, however, of all your endeavors, and with the greatest care, you will sometimes find that you have failed to make a perfect cure; and instead of bony union, only a kind of ligamentous connection will have taken place, impairing very much the use of the member. But still, with proper care, we will *generally* succeed in effecting a firm union.

We may also have a fracture of the *coronoid process.* This is nearly always associated with a rupture of the ligaments; and my principal reason for mentioning this, is that it is nearly always associated with luxation of the bones of the fore-arm on the arm, producing the same deformity as that accident. But, if the deformity be produced by a laxation of the fore-arm, it cannot be reduced, except by great force, and when removed, it does not reappear; while if it be produced by fracture, then, by flexing the fore-arm on the arm, the deformity is at once removed, but returns again as soon as the arm is extended. By this circumstance you readily distinguish between the two cases.

In *treating* a fracture of the coronoid process, all that you have to do is to put up the arm exactly as I have told you to do in fracture occurring through the condyles, maintaining the adjustment until bony or ligamentous union is obtained.

LECTURE XX.

FRACTURES OF BONES OF FORE-ARM CONTINUED—HEAD OF RADIUS—LOWER PART OF RADIUS, ETC., ETC.—CARPAL BONES—METACARPAL BONES—FINGERS.

We propose, gentlemen, to continue the subject of fractures occurring in the fore-arm. You will recollect that, in our lecture of yesterday, we spoke of the fracture of the olecranon and coronoid processes of the ulna, and of the treatment of these accidents. When we consider the other fractures of these bones, we find that we must vary our method of treatment, according to the points at which they occur. In the first place, fracture may occur through the *neck of the radius*, with or without a fracture of the ulna.

When we have a fracture of this kind, there can be no difficulty in detecting it. Placing yourself by the side of your patient, press your thumb firmly upon the rounded head of the radius, and with the other hand pronate and supinate the hand of the patient. The nature of the accident will be at once detected by a want of motion in the head, while the rest of the bone moves freely with the hand. Coaptation here will be found very easy; after having performed which, a compress should be applied in front, the fore-arm flexed on the arm, and the whole put up as in fractures through the condyles.

In a fracture which involves both bones, whether occurring at the same level or not, you also experience but little difficulty in discovering the nature of the accident. More or less deformity will generally be present; but where you have any doubt, by seizing the fore-arm at its upper and lower extremities, and bending it as though you would break it, the kind of injury will become evident. Here, too, rotation of the radius will aid you, as it will serve to produce crepitus; the upper portion being also found not to move in harmony with the lower.

In the cases of fractures occurring in these bones, at some point not in immediate proximity to either extremity, it matters not, so far as the treatment is concerned, whether one or both bones be broken, as it is exceedingly simple, and in both cases precisely the same. Apply a compress the whole length of the fore-arm in front, having first put on a tumefaction bandage quite loosely. Then, taking two splints, apply one behind, long enough to extend from below the elbow, to beyond the knuckles, and the other in front, extending from the elbow to the ends of the fingers; and secure these by bringing the roller down over them. The splints should be wide, in order to prevent the roller from compressing the fore-arm, and you should be careful so to apply the anterior splint, as to prevent it from rubbing the arm at the elbow. The arm is then to be flexed, and carried in a sling. When you have an angular hinged splint, such as that I here exhibit, it will be found very convenient in the treatment of these fractures, as, from its construction, we can place the fore-arm at any angle we may desire. You should remember always, that your compress should so bear upon the interosseous space, as to press the bones apart, and counteract the action of the pronator quadratus. Were you to neglect this precaution, and allow the bones to be drawn together, after the fracture had united, you would find your patient unable to pronate or supinate the hand. It is with the object of avoiding this that we use the long compress.

In reference to these fractures, I have next to call your attention to one of far greater importance than any I have yet spoken of as occurring in the fore-arm. I allude to fracture taking place in the *lower part of the radius.* This is a fracture which, whether it be connected with the joint or not, I have no hesitation in affirming, might often be mistaken for a dislocation; for the hand, with the lower fragment, may be displaced either forwards or backwards. I repeat, then, that this fracture, especially by one unskilled in such matters, would, in nine cases out of ten, be mistaken for a dislocation. The fracture being near the joint, and inflammation coming on very rapidly, the relation of parts is soon destroyed. When this is the case, any one who mistakes the fracture for a dislocation, would, by extension and counter-extension, adjust the parts and leave them so. But when it is examined again at the next visit, it is found that the displacement has returned; and this goes on, from day to day, until union at last occurs, and the unfortunate patient is turned out with a permanent and incurable deformity. I have seen so many instances of this kind that I must impress this accident particularly upon your attention, and request you always to recollect, that while, on the one hand, fractures of the lower portion of the radius *is quite a common accident,* dislocation of the wrist joint is, on the other hand, an accident *so exceedingly rare* that surgeons of great experience and high authority, deny that it *can ever* happen. But if you will bear in mind the remarks I have made, and particularly if you remember that dislocation is a very rare accident, while fracture is a common one, and that the deformity is the same in both, you will at least be placed upon your guard, and your eyes be opened to the necessity, in all cases, of making an attentive examination and carefully seeking for crepitus.

Taking for granted, then, that the nature of the accident is discovered, let us, in the next place, proceed to consider what method of *treatment* may be best adapted to such cases. For many years no difference was made between the treatment of these cases and that of other fractures of the arm, and notwithstanding all the care that was taken, the patient would nearly always come out with a deformed limb. To the late Baron Dupuytren we are indebted, for first pointing out the proper indications to be fulfilled in these cases. In any plan of adjustment which we may adopt, we should make use of such means as will counteract those muscles which tend to draw the fragment up. We use two splints, long enough to extend from the elbow to the ends of the fingers, and so formed that each shall be bent downwards at the wrist. The splints are thus formed in order to retain the carpus in a position bent completely to the ulnar side—that bone thus affording a firm support. In addition it will be well to apply a third splint, formed of soft iron, and so curved and moulded as exactly to fit the ulnar side of the fore-arm and hand, to which it is to be applied. This supports the hand at the angle of the other splints. We also use two triangular shaped compresses. Where the prominence of bone is on the posterior part of the wrist, place here the large end of one of the compresses, and the small end upon the radial fragment; so also place the other compress where the prominence is in the front, with its large end opposite the small end of the other, and complete the adjustment as in fracture of both bones of the fore-arm. A more simple, and perhaps equally efficient method of treating this fracture, is one proposed by Dr. Bond, of Philadelphia. It consists of a wooden splint, cut to the shape of the outline of the fore-arm and hand, and long enough to extend from the fold of the arm to the phalangeal end of the metacarpal bones. Across the palmar face of this, a convex block, large enough to fill the palm of the hand, is attached, over which the fingers are placed and secured by a few turns of the roller bandage used in securing the splint to the arm in the ordinary way. Dr. Hays has employed successfully a very simple, extemporaneous modification of this apparatus, consisting of the head of a roller-bandage of sufficient size, instead of the block, the tail of the roller being carried, first, longitudinally over the opposite end of the splint, then by a few circular turns around it. The apparatus, thus prepared, is to be applied, and secured to the arm and hand by circular turns of another roller, a compress being interposed. By this simple means I have recently treated four cases of fracture of the lower end of the radius, and with very satisfactory results. Here, as the fracture is in the neighborhood of the joint, or involving it, we have much more inflammation to contend with; and whenever we meet with high inflammatory action, we should subdue it by antiphlogistic measures before we apply any apparatus. Ever be particularly on your guard against the serious mistakes which ignorant surgeons are continually making here,—confounding fractures and dislocations with each other. Bear in mind, that fracture is a very common accident, but that, owing to the strong ligaments uniting the parts, together with flexor and extensor tendons, dislocation at the wrist joint is exceedingly rare; and, I apprehend, that in ninety-nine cases out of one hundred, the bone will sooner give way in some of its parts, than a dislocation will occur. I have never seen a case of this kind, and, as I have before remarked, it is an accident so rare, that surgeons of distinction have even doubted the possibility of its occurrence.

Fractures of Bones of Carpus and Metacarpus.

I might go on in the next place to speak of fractures of the individual bones of the carpus; but, from the minuteness of these bones, and the strong ligaments which bind them together, fracture seldom takes place here, unless caused by gunshot wounds, the explosion of powder, or some crushing force. In general terms, however, we may say, that the fragments should be placed in apposition, a compress applied, and, to prevent motion, two splints should be used, one placed anteriorly, and the other posteriorly.

When extensive comminuted fracture takes place, and necrosis results, a cure cannot be effected until the dead portions of bone are removed, on account of the continual irritation and suppuration which is kept up by them.

Fractures of the *metacarpal* bones are of much more frequent occurrence. In type, the bones are cylindrical; and the fracture may take place through the neck, or the shaft, and it may also involve one or more of these bones. From the strong and numerous bonds of connection between the bones, there will be little or no deformity.

In nearly all cases, however, by flexing the hand in such a manner as to bend the carpus, a slight angular displacement will be perceived on the dorsum of the hand, and this will be all the deformity which will occur. There will be but little difficulty in the diagnosis. But it is my duty to state here, that I have seen a greater number of false joints arising from this fracture, than from any other. One reason for this no doubt is, that both the patient and surgeon are apt to regard the fracture as of but little importance, and therefore fail to treat it with sufficient care, and to prevent motion between the fragments. Another reason is to be found in the want of recuperative power; which is found to exist in these bones in but a low degree. Hence, too, in many diseases and injuries of the metacarpal bones, they are found to fall very readily into necrosis. This being the case, it is a matter of importance never to underrate the importance of these simple fractures, and always to impress upon your patient not to remove the apparatus until you are sure that union has been secured.

Now, when you have to treat a fracture of the metacarpal bones, the simplest plan is to use two compresses—one to fill up the palm of the hand, the other to be placed on its back—and two splints, one in front, and the other behind. These must be secured in such a manner, as to prevent all motion at the point of fracture; and they must be worn until perfect union has taken place.

As regards the

Fractures of the Phalanges.

I may dismiss the subject with a very few words. They will be easily diagnosticated by flexion and extension, crepitus being always produced. All that is necessary is, a narrow roller-bandage, half an inch wide, to be used as a tumefaction bandage. Apply an elongated compress over this, and then an ordinary paste-board splint, which had better extend over two or three fingers, so as to make these act as lateral splints. Passing the roller up, upon and around the hand, secure it there. It may be necessary to include all the fingers in the roller, and thus, as it were, to glove the whole hand—an expedient which is very useful in many diseases of the hand and fingers.

In our next, we will go on to the consideration of fractures occurring in the lower extremities.

LECTURF XXI.

FRACTURES CONTINUED—OF OS INNOMINATUM—OF FEMUR IN THE CAPSULAR LIGAMENT—OUT OF THE LIGAMENT.

Next in order, gentlemen, we proceed to the consideration of fractures occurring in the lower extremity. Under this head, we will first speak of

Fractures of the Os Innominatum.

This bone, as you are aware, includes, or is made up by the *Ilium*, *Ischium*, and *Pubis*, and with its fellow of thė opposite side, constitutes the anterior and lateral portions of the pelvis—the posterior portion of which is formed by the sacrum. Now, from the intimacy of union which exists between these bones, they form a strong bony arch, and are seldom broken, unless submitted to violence from two forces acting in opposite directions,—as, for example, where the pelvis is crushed upon a hard pavement by a wheel passing over it, &c.—and by gun-shot wounds. As a general rule, there will be but little displacement, this also resulting from the firm connection existing between the different parts; though in some cases, as in fracture of the tuberosity of the ischium, the deformity may be great. Simple inspection and manipulation, aided by the crepitus generally produced by moving the thigh, will, in most cases, at once reveal the nature of the accident.

In speaking of fractures occurring in these bones, there is one species which should be particularly mentioned. I allude to fractures taking place at the *bottom of the acetabulum*, produced by the head of the femur being driven violently against, and sometimes even entirely through it, and into the cavity of the pelvis. A degree of deformity is thus impressed upon the hips, which, together with the entire loss of motion, will point out the kind of accident.

As a general rule, in the treatment of these fractures, the patient should be placed in that position which is best calculated to relax the muscles of the part. The thighs, with this view, should be flexed upon the trunk, and the legs on the thighs. The fragments are to be replaced as nearly as possible in their natural positions; a bandage is to be passed round the pelvis; and such compresses are to be used as may be required. It is proper that I should, in this connection, remark, that these accidents may sometimes be complicated with laceration and inflammation of the bladder, and with suppression of urine. As soon as this is perceived, copious venesection should at once be resorted to; the hip bath should be used; and, in short, the anti-phlogistic treatment should be vigorously employed, the catheter also being freely used. In fractures through the acetabulum, a modification of the plan of adjustment becomes requisite. A large cushion should be placed between the upper parts of the thighs, and the knees should be brought together. The head of the bone is thus drawn out of the cavity—the cushion acting as the fulcrum of a lever. If extension or counter-extension is necessary, it must be performed in the usual manner; and sometimes the neck of the femur is confined in the fracture, when it becomes necessary to extract it by a rotary movement of the thigh. These fractures, too, like all others which involve the joints, will cause inflammation in the hip-joints, which must be combatted by leeches, fomentations, &c., combined with general antiphlogistic treatment. The other fractures of these parts are of such little importance, that they need not be considered here; and we now pass to the consideration of

Fractures of the Femur.

When we consider the weight sustained by the femur, its exposed situation, &c., it becomes a subject of wonder, that fractures of this bone are not of more frequent occurrence. Though they are not very common, yet they are sufficiently so to render it necessary for the surgeon to be fully acquainted with them. Like the other long bones, the femur is liable to fracture at several points; as, through the *head, neck, shaft,* &c. The rounded head may be fractured from the neck, just at that point at which it is, up to the eighteenth year, connected only by cartilage to the rest of the bone; and again, a fracture may occur in the neck of the bone, either within or without the capsular ligament; and it will be a matter of great importance to distinguish properly between these two. Yet it may, by extending obliquely, be partly within and partly without the capsule; and sometimes it may even extend through the trochanter.

When fractures occur *within the ligament* they bear so strong a resemblance to those taking place in the analogous part of the humerus, that it will not be necessary for me to speak of them at length. The diagnosis will be very difficult, particularly in young subjects. The outer part is so slightly removed, that there will be very little or no displacement; and if the surfaces of the fragments be rough, there will be but slight deformity from rotation. Some patients, indeed experience so little loss of motion, that they are even able to continue to go about. In time, however, there will be perceived a halt in the gait, a kind of up-and-down, gliding motion. Sometimes a slight deformity supervenes; for when the patient is placed on his back and carefully examined, shortening to the amount of one, one-and-a-half, or two inches will be detected; which produces a peculiar appearance, the trochanter of the injured, being higher up than that of the sound side. A falling backwards of the upper portion of the thigh, from the rotator muscles prevailing over the others, will also attract attention, as was first pointed out by Ambrose Paré; and where the limbs are brought together, the deformity of rotation will also be found to exist, the toes being, in most cases, turned outwards; though *sometimes*, however, they are turned inwards, and thus the case may be confounded with one of dislocation. To confirm our diagnosis, we may rotate the thigh, and if fracture exists within the capsule, the arc described by the trochanter major will be much smaller than that described by the trochanter of the opposite leg. Here, too, our object is, if possible, to detect crepitus; and, should we fail to do so by the above mentioned method, we should vary the position of the limb; and it may even be necessary, from one fragment being drawn over or above the other, to extend it, so as to bring the rough edges in contact, before we can produce the crepitus. Again: in obscure cases, you may detect crepitus by requiring your patient to stand on the sound foot, leaning on the edge of a bed or table, by placing the leg between your knees and seizing the thigh, and by forcing it upwards and downwards. So much, then, for the diagnosis of this most serious accident; and this, I may say, is a very important point, as we shall hereafter see. Whenever a fracture takes place here, whether it is oblique or not, a change takes place in the neck of the bone. Owing to an absorption of the earthy matter, there is a greater or less removal or disappearance of the neck, causing the hip of the injured side to be considerably shortened. And in this connection, there is still one subject remaining for discussion. It is the question whether, in fractures occurring within the capsular ligament, a bony union *ever does* take place. Now, there may appear no valid reason why it should not take place, as well in those fractures occurring *within*, as in those occurring *without* the ligament; but, however plausible this may appear, experience shows that the reverse is the case. Again and again, after having experienced all the care which judicious attention could afford, the patient has left his couch a miserable cripple for life, and doomed, ever after, to suffer from all the inconveniences of a false joint. This general want of success led the surgeons of former times into the directly opposite extreme; for they maintained that bony union here could seldom or never be procured; and to this number belonged even the distinguished Sir A. Cooper. Even at the present day, this may be considered as still *almost* true; for though experience has shown, that bony union may take place in *some* cases, yet these are but exceptions to the general rule. I have seen but *one case* in which it has been obtained; and this was in the person of an individual of twenty-one or two years of age. I might here enter into a discussion concerning the various causes of this result; but this would be unnecessary, and I shall content myself with a mere enumeration of the principal ones. In the first place, we may mention the great difficulty which is encountered in bringing the fragments into proper apposition; and secondly, the redundancy of synovial fluid; which may materially interfere with union, by washing away any bony matter which may be deposited; while a gradual and progressive absorption of the neck, the scarcity of blood-vessels in the internal fragment, and so on, must all be taken into consideration; though there is no one of these circumstances which may, alone, be assigned as the sufficient cause. Whether we should attempt, in any particular case, to procure this union or not, is a grave question; in determining which, all the circumstances bearing on each individual case must be carefully considered. The disposition of the individual, whether tractable or not, his age, constitution, general health, and the circumstances which surround him, should all be taken into account. If the case is one in which we believe that bony union cannot be procured, it would be utterly unnecessary to subject the patient to the tedious restraint attending any attempt at procuring such a union. But if, on the other hand, we think that this desirable object may be attained, it then becomes our imperative duty to give our patient every chance of obtaining it; and we must take such steps as shall most tend to the production of this result. The decision of this question must, in each individual case, be left entirely to your own judgments. If you determine not to attempt to procure union, you should make use of simple treatment, as in other fractures. The patient should be placed on his back, kept quiet, and the antiphlogistic treatment must be enforced until the

Ashley Cooper, p. 338
Dessault p 159
[illegible] [illegible]
[illegible] [illegible]
Sir [illegible] – p. 13

must be enforced until the inflammation has subsided. Our palliative treatment, then, consists in flexing the leg on the thigh, placing the thigh on an inclined plane, and applying a bandage around the pelvis, to support the parts, and keep them as much as possible in apposition, until the inflammation has subsided, when the patient may be allowed to walk with the aid of a stick, and gradually to use the limb. This is the course recommended by Sir A. Cooper. But when the patient is young, and willing to undergo the necessary treatment, and when there is room to hope for a bony union, you should resort to the use of a fracture apparatus; and as the means to be employed are the same here as in fractures exterior to the capsular ligament, we will defer the consideration of them until we come to speak of the treatment of the other fractures of the bone.

Let us, in the next place, suppose a fracture to have taken place *outside of the capsular ligament.* In this case, the limb will be shortened to the extent of two, three, or even four inches; and there will nearly always be the deformity of rotation, either in or out. In the greater number of cases, however, the rotation will be outward. The only accident with which this fracture can be confounded is dislocation. It can easily, however, be distinguished from this accident; for, if the dislocation be backwards, for example, there will be, it is true, shortening of the limb, and the toes will be turned inward; but where there is fracture, if we place the patient on his back, we can, by traction, easily bring the limb to its proper length, and on omitting this traction, *it at once returns to its shortened state.* Again, in dislocations, we find that rotation can only be effected by considerable force; whereas, in fractures, it is very easy; and if, by force, we effect rotation, the arc described by the trochanter major, will be of much smaller extent in the latter than in the former case. Taking all these circumstances into consideration, there will be no difficulty in properly diagnosticating the nature of the accident. If, in these cases, the parts be brought into proper apposition, and kept so, bony union may take place. But, as I have already said, the fracture sometimes extends partly within and partly without the capsular ligament; and in this case it frequently happens that we will obtain bony union. We shall consider, in our next, the appliances used for treating fractures of the femur.

LECTURE XXII.

FRACTURES OF FEMUR NEAR JOINT CONTINUED—OTHER FRACTURES OF FEMUR.

In the preceding Lecture, we entered into considerable detail concerning fractures of the femur occurring near the joint. We were led to do this by the importance of the subject. You will remember, then, in the first place, that unless very circumspect, you will be liable to make a false diagnosis; and, in the second place, that, after the nature of the accident has been ascertained, there will nearly always be more or less uncertainty in the treatment. The diagnosis is sometimes difficult, the prognosis generally doubtful. You will also remember, that your prognosis will differ widely, in accordance with the situation of the fracture, whether within or outside of the capsular ligament. When within, there is scarcely any hope of obtaining bony union; and this being the testimony of universal experience, you will readily understand how absurd it is, to keep the patient subjected to the long and tedious confinement of a fracture apparatus, a proceeding from which we can expect nothing, and which, particularly in old and debilitated subjects, may even eventuate in death. But when the patient is young and strong, and when all other circumstances are favorable, and there is even a slight hope of obtaining ossific connection, we are bound to afford our patient every chance which can be offered from the resources of our science. Not to dwell longer here, however, we pass, in the next place, to treat of fractures of the shaft. These may be of all the various types, oblique, transverse, &c.; and they may occur in different parts of the shaft. The fracture to which I shall now direct your attention, is that which takes place low down, directly above the condyles. Here we will find great difficulty in retaining the fragments in their proper position. Violent inflammation and tumefaction of the joint is apt to result, from the synovial membrane, which, as you are aware, forms a fold under the quadriceps extensor muscle, extending some distance above the joint—becoming involved in the injury; and this inflammation may finally result in anchylosis of the joint. Here, then, you will at once recognize a great difference between this fracture and those occurring higher up on the shaft; and, if you will bear in mind the remarks already made on fractures through the condyles of the humerus, you will immediately perceive the important character of the accident, and be able to appreciate the serious consequences which may arise from it, as these two accidents are exactly analogous. But we will now proceed to the treatment of these fractures.

With regard to those occurring within the capsular ligament, having already dwelt particularly on them, we will only repeat here, that if the patient is old, we would simply confine him to his back, until inflammatory action has subsided, and then allow him to move about a little on crutches, and thus gradually regain a partial use of the limb; while if the subject is young, and other circumstances are favorable, we should attempt to procure a bony union; and for this purpose we should proceed as in fractures occurring outside of the capsular ligament. Now, in considering the treatment of the various fractures of the femur, we are met on the very threshold by a disputed point. I allude to the question, whether these fractures should be treated with the leg in the semiflexed, or in the straight position. This matter is still under discussion, and though speaking from my own experience, I regard the semiflexed as equally as good as the other, I am free to confess that I have adopted the straight position also, and, as a mechanic would say, in both cases, I have succeeded in turning out a very good job. Perhaps, after all, this is not a question of so much importance as has been supposed. For the treatment there has been proposed a variety of apparatus. *All* of them we will not undertake to discuss, but shall only mention some of the most prominent. Here, first, we have Dessault's apparatus, as modified by Dr. Physic. It consists essentially of three splints, one to be placed on the inner side of the thigh, and extending from the perineum to the the foot; one on the front of the thigh, extending along its whole front aspect; and the third on the outer side, and extending from the axilla to beyond the foot. The upper end of this long splint is surmounted by a crutch-head to rest against the axilla. At its lower end is a projecting block, over which a handkerchief, which has been previously attached around the ankle and to the foot, is to be passed and secured to the lower end of the splint; by which means extension is to be kept up. If you will bear in mind the flexible nature of the spinal column, and the constant inclination of the patient to bend towards the opposite side, you will at once see, that the proper extension could not be kept up. Another method of treating these fractures is by what has been known as

Hartshorn's splint, consisting of a long splint for the outer side, which extends from just below the arm-pit to beyond the foot, and a short splint, padded at its upper end, which is to be placed on the inner side of the thigh, and which should extend from the perineum above, down as low as the outer splint below the foot. These two splints are united at their lower extremities by a cross-bar, and extension is to be kept up by a screw working a movable foot-board, which slides up and down. Counter-extension is made from the perineum by aid of the short padded splint. Now, I have no doubt that fractures of the thigh may be successfully treated by either of these methods; but, in fractures particularly, I am opposed to the use of any complicated apparatus, and feel bound, therefore, to point out and to recommend to you the simplest possible successful methods. Where you have determined to treat a case of fracture occurring in the lower extremities by permanent extension and counter-extension, an easy, simple and efficient method is to employ the long splint of Liston, extending from the arm-pit to a little below the foot, the upper end being secured by a roller passed around the chest, and counter-extension being kept up by a band passing under the perineum, and attached to the upper end of the splint. There have been many and various other methods proposed for the treatment of fracture of the lower limbs in the extended position; and among them we may mention the apparatus of Hagerdorn. Contrary to what you would expect, in using it, the long splint is to be applied to the sound limb, the pelvis being kept perfectly motionless. The apparatus is, perhaps, a very good one. But even *it* is found to be uncomfortable, from the pressure it exerts, and has been modified by Professor Gibson; who recommends the employment of two long splints, one of which is to be placed on each side of the body, extending from the axilla to a short distance below the foot. The lower ends of these pass through a foot-board, which slides on them, and is kept in its proper position by pegs passing through the splints.

I have no doubt that this apparatus will be found very efficacious; but I am by no means certain that it will be found more so than many others which are far more simple.

Some prefer to treat these fractures with the leg in a semiflexed position; and a variety of apparatus has been proposed with this object in view. The simplest of these is the ordinary double inclined plane. The apparatus of junks is convenient, and, if at hand, it may be employed with advantage. The double inclined plane may be formed extemporaneously. The following will be found a good plan for most cases: first, envelop the limb in a bandage of strips, beginning below and applying the strips so that one shall overlap the other like the shingles on a house-top, the last being secured with a pin. Next, apply four elongated compresses of sufficient length, and then two splints, an external one to extend from the trochanter major to a short distance below the knee, and an internal one of corresponding length. Sometimes a third may be used, as an anterior splint. The whole, having been folded in the splint cloth, and secured by three or more tapes or strips of bandage, the limb thus dressed is to be placed upon a double inclined plane. There is one caution which you should always bear in mind in these cases. It is to avoid too much pressure upon, and the consequent sloughing of, the heel, to accommodate which, a hole may be cut in the plane, corresponding to the position of the foot.

By precisely the same means you may put up fractures of the leg also. In relation to the treatment in the semiflexed position, I will now show you an apparatus devised by my former colleague, Professor Smith, of Baltimore. When you desire to use this, the fracture should be reduced as usual; and then, having filled the cradle with some soft substance, to prevent excoriation, the leg should be placed in it at any desirable angle, which, as you see, may be varied at pleasure, by turning a screw. The foot should be attached to a foot-board, and the whole secured by a roller bandage.

A very important advantage arises from the employment of this apparatus. By means of a cord attached to it, the limb may be suspended at any convenient height, and the patient is thus enabled to turn in his bed, and, after a day or two, he may even move from the bed to a chair. This will be found a great comfort, and of considerable advantage to your patient.

Here I exhibit to you another apparatus. It is an American improvement upon an English plan; but, as I have already explained several methods of treating fractures of the lower extremities, we shall at our next meeting proceed to another subject.

LECTURE XXIII.

FRACTURES ABOVE AND THROUGH THE CONDYLES OF THE FEMUR, COMPLICATED WITH INFLAMMATION OF PARTS—FRACTURE OF PATELLA—FRACTURES OF TIBIA AND FIBULA—BONES OF FOOT, ETC.

In the general observations made a few days ago, I stated that in cases of fracture of the femur just above the condyles, very serious consequences might result from the accident, and great difficulty arise to the surgeon in its treatment. Here the lower fragment is short, and almost any apparatus would fail to exercise the proper leverage upon it. I would, therefore, advise that, instead of adopting the *extended*, you should treat such a case in the *semiflexed* position, as better calculated to relax the muscles. It would be well to use angular paste-board splints, moistened previously to their application, and having their angles corresponding to the angle of the leg. One is to be placed internally against the perineum, and the other outwardly, both extending to the malleoli below. The whole should be placed over a double inclined plane, or be suspended in a Smith's cradle, such as has been already exhibited, and which you will find a good substitute for the splints. But, besides these fractures through the shaft, and above the condyles, I also mentioned that a fracture could take place through the condyles themselves. Owing to the amount of synovial membrane, and the liability of the joint to be involved, a high degree of inflammation may follow this accident, and this must be subdued before any apparatus whatever can be applied. To avoid anchylosis, the joint should be gently moved from time to time, during the treatment. You should apply a compress on the condyles, and paste-board splints to the internal and external parts of the thigh; and the whole should be secured by a roller bandage. It is a matter of the highest importance that you should always bear in mind, that in these fractures, no retentive apparatus of any kind is to be put on, until the inflammation has subsided. The leg should merely be flexed on the thigh, the thigh on the pelvis, and the limb supported by pillows properly arranged, the patient being kept perfectly quiet, until, by appropriate treatment, the inflammation has been subdued.

Next in order we come to speak of

Fractures of the Patella.

These may be *oblique, longitudinal,* or *transverse.* They may be brought about by disease, or by violence alone or aided by an involuntary contraction of the muscles attached to the bone. This is always a serious accident. The inflammation is apt to run on to a troublesome extent, and to lead to the same results which I have already alluded to, as accruing to fractures through the condyles of the femur. Recollecting that the *quadriceps extensor* has its insertion into this bone, you will perceive, that by its action the fragments will be kept widely apart. Thus, unless particular care be taken, the only union which can be obtained will be of a ligamentous nature. This ligamentous structure is sometimes found to be an inch and a half or two inches in extent; in which case the action of the limb will be more or less impaired. Hence, it becomes a matter of very great importance that the fragments be kept in such perfect contact as to prevent this result, and secure a bony union. As regards the diagnosis, there can be no difficulty whatever; the bone being superficial, its fracture is easily felt.

Where the fracture is longitudinal, one fragment will be thrown to the inner, and the other to the outer side of the knee, and a line of depression will be distinctly perceived, marking the point of separation between the fragments. In the treatment of transverse fractures it has been adopted, as a universal rule, that the extended position should be selected. Perhaps the most convenient apparatus is that which is used in fractures of the olecranon process. This is sufficiently simple. Put on a common uniting bandage as follows:—Placing a strip of bandage on each side of the limb, secure both of them by a few circular turns of a roller, commencing below the knee and extending up to it; then place a compress above the patella, and secure it there by a few figure-of-eight turns over that bone; pass one or two circular turns above to secure the strips there; and lastly, tie the opposite ends of the strips together. This will tend to keep the fragments in apposition. Then, taking a long splint that will extend from the upper part of the thigh as low down as the malleolus, place it on the posterior part of the leg, and secure it there by a roller passed from below, upward, making a few figure-of-eight turns at the knee. The limb is then put on a pillow with the heel elevated, so as to relax the rectus muscle; and in the after treatment, the same rules are to be followed, as have been inculcated elsewhere. Inflammation must be combatted, and anchylosis may be prevented, by occasionally moving the joint. The treatment of longitudinal fractures of the patella will be a far less difficult undertaking. The leg should be placed in the extended position, a compress applied on each side of the patella, secured by a figure-of-eight bandage, and a splint adjusted posteriorly, exactly as in transverse fractures.

We go on in the next place to consider

Fractures of the Bones of the Leg.

They may take place high up in the neighborhood of the joint; but, as the treatment in such cases is precisely the same as that of fracture through the condyles of the femur, I shall not stop to make any remarks upon such cases. If only one bone is fractured, the other, acting as a splint, prevents there being much displacement. Consequently, there will be but little deformity in such a fracture. When both bones are broken, there will be no difficulty in the diagnosis. The finger passed along the surface of the bone, will at once detect the point of the fracture, or it may be easily discovered by bending the bones upon themselves, as though you would bring the ends together, thus causing them to form an angle at the fractured point. In the treatment you may adopt either the semiflexed or the extended position. You may employ any of the apparatus used for fractures of the thigh; the apparatus of junks, if you choose, or the short splints of Liston, or hollow carved splints, and you may use the many tailed bandage, or the common roller. In ordinary country practice, the simplest and most convenient plan of treatment is that by the apparatus of junks, put on precisely as in fracture of the thigh. When this has been applied, you may allow the patient to place the limb in any convenient position, as over a double inclined plane, for example. But, as I said before, a very good apparatus is afforded us by *Liston's short splint.* When you are desirous of using this, place two strips of bandage longitudinally, on the inner side of the knee, having first applied lateral cushions; secure the strips by a few turns of a roller, and passing the ends through the mortice, tie them there. This forms a point for counter-extension. Then, having split one extremity of the roller, knot the ends together so as to form a loop, and hitch this over the notch in the lower end of the splint. Next, place a compress over the foot; and then carry the bandage obliquely over the instep, behind the heel, through the notch in the lower end of the splint, and so on. Thus extension is produced. Finally, secure the whole by spiral turns of a roller passing up to the knee. You will find this a very convenient extemporaneous apparatus in country practice; and should you desire additional security, you may add another splint on the outer side of the leg. In the treatment of these fractures, I may also *mention* the apparatus of Mayor. It is a simple, comfortable, and efficacious method of adjustment.

There is one kind of fracture of the leg, which, although at first glance it appears slight, is yet of so much importance, that I must invite your attention particularly to it. I allude to a fracture of the *fibula at its lower extremity*, associated or not with dislocation. It is very apt to be followed by great deformity. The peronei muscles draw the foot forcibly outwards, and tilt the sole up, so that though you may flatter yourself that every thing is going on well, after you take off the apparatus, and the patient attempts to walk, you find the foot constantly tending to cant outward and upwards. I have seen so much deformity resulting from errors in the management of this fracture, that I must urge on you the necessity of bearing constantly in mind the indications connected with its treatment. I must point out to you the principles involved, the original explanation of which we owe to the celebrated Baron Dupuytren. The great difficulty arises from the action of the *peroneus longus* and *peroneus brevis* muscles. The great indication, then, is simply to antagonize the action of these muscles. Place a thick compress on the inner side of the leg, leaving the lower end doubled under, and do not let it extend below the malleolus. Over this apply a splint, designed to act as a lever, and secure it above by a roller passing downward; and then draw the outer margin of the foot downward, so as to turn it in towards the splint, and secure it there by a roller passing in the form of a figure-of-eight, over the instep and around the splint. Thus, you perceive, the action of the peronei muscles is completely antagonized, and the fragments are approximated. This is the plan to be adopted, and I wish you to bear it particularly in mind, for if you treat this fracture in the ordinary method of treating fractures of the leg, you will be very lucky if your patient comes out without considerable deformity.

Sometimes the *outer malleolus* is fractured transversely, though the portion of its extent which is covered, on its inner side, by cartilage and synovial membrane. Unless great caution be used in these cases, too, you may fail to obtain bony union.

Again; a fracture may sometimes take place through the *lower portion of the tibia*, or even through the *malleolus*. The best method of treating this I apprehend, is, by the ordinary immoveable apparatus; which is constructed in the following manner. After the proper adjustment is effected, a roller bandage is applied, and its outer surface is painted over with a solution of starch: then, over this, is placed paste-board splints, cut into proper shape, which are also covered with starch: then another roller is applied, which is again to be starched; and this process is to be repeated, till the apparatus has attained the requsite degree of thickness. The starch drying, a thick, firm encasement is formed for the limb; and this is what is called the *immoveable apparatus*. It should never be applied, until after all inflammatory action has been subdued. Some surgeons make use of it in the treatment of all those fractures to which we have already alluded: and when all inflammation has been subdued, and proper care has been taken in its application, I have no doubt that it may be made a very efficacious method of treatment. While, however, I thus speak in praise of this apparatus in the treatment of fractures, I should be guilty of a dereliction from my duty, if I did not at the same time say to you, that it is as yet an unusual remedy; and among the common people, if any accident arises, the surgeon is very apt to be blamed. I should also state, that unexpected *tumefaction* may take place, particularly when the injury is in the neighborhood of a joint, and irreparable injury may result. Already, indeed, have cases occurred, in which surgeons have been called upon to pay damages for mal-practice in this respect, even when the utmost precaution had been observed. Be circumspect, then, in the adoption of this method. Watch carefully the progress of your patient; and distinguish those cases which may be correctly treated by this "*immoveable apparatus*," from those in which its employment should be wrong.

As regards

Fractures through the Tarsal and Meta-Tarsal Bones,

We have no remarks to make, except with respect to those occurring to the astragalus and os calcis.

Fractures of the *astragalus* may be of a very serious nature.

Possessing the recuperative power in but a very small degree, this bone when broken is remarkably apt to fall into necrosis. This gives rise to a continued suppuration, and renders relief impossible, until either the dead part, or the whole bone is removed. The irritation increasing, and the inflammation extending, even amputation may become necessary. In several cases, I have taken out portions of the astragalus by cutting into the joint, and removing the necrosed portions with the forceps. When the whole bone is removed, the tibia settles down upon the calcis, and the patient may walk very well, the shortening of the limb not being as much as you might suppose.

With regard to fractures of the *os calcis* I may say, that they require no particular remarks, except when occurring through its posterior part. In these cases, the utmost care is to be observed in keeping the fragments together. It is very necessary to keep the foot extended and the upper fragment drawn down. For the accomplishment of this end, you may use the starch bandage, with some of the apparatus given in the books for the treatment of rupture of the tendo Achillis. Here, however, you may use your own ingenuity, keeping in mind, that the main objects to be fulfilled are the perfect extension of the foot, and the counteracting the power of the gastrocnemius and soleus muscles. A very good plan is, to use a common slipper, tacking a piece of tape to the heel of it, and attaching this posteriorly to a band passed around the upper part of the leg.

LECTURE XXIV.

COMPLICATED FRACTURES—COMPOUND FRACTURES—COMMINUTED FRACTURES—COMPOUND COMMINUTED FRACTURE—TREATMENT—FALSE JOINTS—TREATMENT.

I would observe, gentlemen, that our remarks, heretofore, were designed only to apply to *simple* fractures, those not accompanied by any serious injury to the surrounding soft parts. Wherever the soft parts *are* lacerated, and the bone protrudes, we applied to the case, as you will recollect, the term of *compound fracture.* In other instances, the bone may be crushed; and then we are presented with a case of *comminuted* fracture: or these two may be combined; and then we have what we call a *compound comminuted fracture.*

When you are presented with a case of *compound* fracture, the important duty to be performed is, after having adjusted the bones, to draw the external edges of the wound as neatly as possible together, and to secure them by adhesive strips, or, if necessary, by suture. The object is to secure union of the soft parts as soon as possible, and thus convert a compound into a simple fracture. For this purpose it has been recommended—and by no less an authority than that of Sir Ashley Cooper—to apply a pledget of lint, moistened with the blood of the wound, over the external surface of the injury. A neater method, I apprehend, would be to moisten the lint with collodion, provided the injury be not of very great extent, for applied to a large surface this substance might create too much irritation. And in this connection I would remark, that when there is great laceration, accompanied by inflammation and suppuration, you must be exceedingly cautious how you apply the ordinary fracture apparatus. Carelessness in this respect may even result in the loss of the limb. It will always be better in serious injuries, to place the limb in an easy position on pillows, until, by the ordinary antiphlogistic treatment, the inflammation is subdued. As soon as this is done, or as soon as the excess of inflammatory action has subsided, when the slough, if there is one, has separated, and granulations are springing up, it will then be time enough to put on your apparatus, and treat the injury as a simple fracture. On account of the discharges, it will be necessary, in these cases, to dress the wound at least once a day. Consequently, when dealing with the lower limb, the apparatus of junks will be found very convenient, having to remove only the strips which are soiled, and not being obliged, in doing so, to lift the limb, since the clean strip may be attached to one end of the foul one, and thus be drawn into its position by the removal of the latter. Compound fractures are always serious accidents, as they give rise to great constitutional derangement; and against this it is that your therapeutical agents should be particularly directed. You must not, however, because there is a great degree of inflammation, urge your antiphlogistic treatment too far; for under the influence of this very inflammation, the constitution may rapidly yield, the vital powers become debilitated, and, sooner than you expect it, you may be called upon to support the patient with stimulants.

When you have a

Compound Comminuted Fracture

To deal with, it is important that you should examine the spiculæ of bone with care. But in this respect, let me urge upon you one particular caution. Be not over-anxious to remove *all* of these spiculæ; be circumspect; and save as much of the bone as possible, for the more you thus preserve, the less work will nature have to perform.

If the spiculæ are loose and detached from the periosteum, it then becomes necessary to remove them; but if they are not thus separated, then endeavor to place them as nearly as possible in their natural position, and thus preserve as much as you can of the structure.

You will sometimes meet with cases of compound comminuted fractures, in which it becomes a problem for you to solve, whether it will be in your power to preserve the limb without risking the life of the patient. In other words, the question of amputation will arise. To solve this problem, you will sometimes find an exceedingly difficult matter. In forming your decision, you must consider,—first, the ***extent*** of the injury; secondly, the ***parts involved***; thirdly, the ***constitutional powers*** of your patient; and fourthly, the ***condition*** of the subject, or those circumstances under which the treatment is to be conducted. If the injury is extensive, the principal vessels lacerated, and the nerves torn asunder; and if the vitality of the parts cannot be supported, then it would be madness to attempt to save the limb; for, by so doing, you would endanger the life of your patient, which risk might have been avoided by a timely resort to amputation. If the constitution is impaired, or broken down by bad habits, and the circumstances surrounding the individual operate in an unfavorable manner upon those processes by which nature effects the union of parts, amputation again becomes necessary. Great danger would accompany the attempt to save the limb under such unfavorable auspices; though I would not have you infer from this, that you should hastily resort to amputation. Be careful, and do not run into this extreme; always consider carefully the circumstances of each case; and form your judgments only after due reflection upon them.

There is, again, a great difference in the results attending these fractures, depending upon the *location* of the accident.

Whenever you have a compound fracture involving any of the large joints, particularly those of the lower limb, and the articulation is much injured, very frequently, the only chance for your patient will consist in the amputation of the limb. Few constitutions can stand the inflammation, which is almost necessarily the result of such an injury. Still, however, be careful in forming your decision, and in every case fortify that decision by a careful consideration of all the circumstances of which I have already spoken.

Another complication, which is frequently engrafted on these accidents, is *tetanus*. It therefore becomes highly important that you should keep down the susceptibility of the nervous system, and take every precaution to prevent the supervention of so terrible a result.

Here we are met by the question, whether or not this terrible malady can be checked by resorting to amputation immediately after its symptoms have been developed. Generally it is considered as unavailing; and this impression appears to be confirmed by universal experience. Little, indeed, can any treatment avail. The disease will run its course, and all that we can do is, to resort to the ordinary remedies and stimulants appealed to in such cases. Opium and its compounds, cannabis Indica, brandy, ether, chloroform, &c., &c., should be tried.

There is still another serious complication which will sometimes present itself in these cases. The sharp edges of bone, or some of the spiculæ, may lacerate some important vessel, and give rise to an alarming, and even dangerous hemorrhage. Of course, the first indication here, I need scarcely say, is to arrest this hemorrhage as soon as possible. As a temporary means, we may resort to the tourniquet; or, as a permanent recourse, we may use the ligature at once, if it is possible to find the orifice of the lacerated vessel. But this is often impossible, and, consequently, it becomes necessary, if the vessel be large, to cut down and tie the main artery at some point above the seat of injury, in the same manner as when this operation is performed for other purposes.

I have deemed it necessary, before leaving this subject, to make these remarks on compound and complicated fractures; and let me repeat, that a *compound* fracture must always be regarded as a serious accident, and a *compound comminuted* one as still more important.

There are still one or two other particulars relating to fractures in general, which deserve some special remarks. It will sometimes happen, that, either in consequence of some fault in the constitution of the patient, or error in the adjustment, no bony union will be found to have taken place, and there is still some motion at the seat of fracture. This is a very unfortunate circumstance; and when the condition has existed for some time, it gives rise to what is denominated a

False Joint.

A change takes place in the ends of the bone: their earthy matter is absorbed; and union is effected only by a dense, ligamentous substance. Sometimes, when the limb is much used, even a kind of synovial membrane is formed between the broken ends of the bone, and a regular artificial joint is established.

The principal inconvenience, in such a case, consists in the patient's possessing a greater number of joints than he is entitled to, and more than is convenient for the ordinary purposes of life: and it becomes a question of importance to inquire—what are the circumstances most likely to produce this result? Sometimes we find it existing when we can find no fault in the constitution of the patient. When this is the case, I apprehend that the want of bony union depends on one of two causes: either your apparatus has not been properly adjusted, and the fault rests consequently with yourself; or the patient has disobeyed you, and prevented the union, by permitting motion in the part. But in another class of cases, the want of bony union is to be attributed, as already said, to a fault in the constitution. When this is the case, in addition to the ordinary local treatment, it will be the duty of the surgeon to study the cause, and if possible to remove it. If it reside in some peculiar diathesis, he must resort to the treatment proper for the removal of that diathesis; or if the patient is weak, it becomes necessary to resort to tonics, stimulants, &c., and in this connection I would remark, that it was formerly thought that the defect consisted in a want of phosphate of lime. Hence, this was given as a remedy to supply the supposed deficiency: but I apprehend that very little good is done by it in this way; though it may be useful in ***strengthening the constitutional powers*** of the patient. A more important point, however, remains still to be discussed. When all our efforts have failed to obtain a bony union, and an artificial joint is formed, the question arises—how are we to relieve the patient of this condition? One of the best and most simple means which we can resort to is *friction*. You should frequently remove the dressing and press the ends of the bone together, rubbing them against each other, and then re-apply the dressing in such a manner, as to prevent all motion. This method, however, is only applicable to recent cases: in such I have several times seen it prove efficacious. Another expedient of a simple kind, especially where the bone is superficial, is to establish an issue directly over the injury, in order to excite sufficient inflammatory action at the seat of the accident to effect union. This will sometimes succeed in causing the deposition of bony matter; but a vastly more certain expedient than either of these, is that recommended by Dr. Physick. It consists in passing a seton between the ends of the bone, and leaving it there for a sufficient length of time to give rise to that chain of actions, which shall result in deposition of bony matter. This remedy is perhaps more efficient, and applicable to a greater number of cases, than any other, though it too will sometimes fail. When you determine to use the seton, you must never regard the inconvenience caused by it, but continue it for some time: indeed it may even be necessary to persist in its use for months. For it to succeed, it is necessary that the ends of bone should not be very far apart. Another expedient which has been resorted to, and which was first proposed by Prof. Dieffenbach, of Berlin, is to make an incision directly through the soft parts, down to the fragments; then to drill, or bore with an ordinary gimblet, several holes in the fragments, two thirds through them; and to plug these up with ivory pegs. The ivory being an animal substance will be absorbed; but, acting at the same time as a foreign body, it will cause sufficient inflammation to effect the desired result; when, if the plugs have not fallen out, they may be removed with the forceps. This is an ingenious plan, and may succeed. We sometimes, however, meet with cases, in which *all* of these methods fail; and under these circumstances, there is yet one plan, by the adoption of which you may obtain bony union. It consists in exposing the ends of the bone, and sawing off a portion of each; when, by shortening the limb a little, the ends are brought together, and union is obtained by the use of an ordinary fracture apparatus. There are still other expedients which may be resorted to, but which are by far less important than those already alluded to. One, which I may mention is, to pass a wire through the articulation, then return it, and bringing the end through, leave it to cut its way out by ulceration. This is inconvenient, however, and frequently fails to produce the desired effect.

You will frequently find it necessary to vary your plan of treatment in these cases, and to resort to one method after the other, until success crowns your efforts.

LECTURE XXV.

DISLOCATIONS—GENERALLY CONSIDERED—OF INFERIOR MAXILLARY.

We design this morning, gentlemen, to enter upon the subject of *dislocations*. The meaning of this term is sufficiently understood by you all, and therefore, perhaps, needs no particular definition from me. I would merely remark, that by the dislocation of a bone, we mean that state in which one of its articulating surfaces is removed from its normal position.

In speaking of dislocation, we find it necessary to recognize several varieties, and to divide the subject accordingly. And, first, when the head of a bone is driven by any violence from its proper position, we divide the dislocation into two varieties: *primitive*, and *secondary*, or *consecutive*. To illustrate, let us suppose a dislocation of the humerus. Here there are only two points at which the bone can, in the first instance, be dislocated. These are, first, *downwards* and *forwards*, and secondly, *backwards* and *upwards*. These are the *primitive* dislocations. But if we suppose the head dislocated downwards and forwards, and then moved from this position, and carried under the clavicle, or under the pectoral muscle, we have an example of *secondary* or *consecutive* dislocation. The one results from the direct cause of the dislocation, the other generally from muscular action.

Again: having reference to the manner in which the displacement is produced, we have *accidental* and *spontaneous* dislocation; the first resulting from direct violence, aided generally by undue and involuntary action of the muscles; and the second, either from gradual changes morbidly going on in or about the joint, (as hydrarthrosis, or an accumulation of water in the joint, for example,) or by muscular action alone.

We have also, *simple* and *compound* dislocation. In the first, there is only a displacement of the head of the bone, accompanied, of course, by more or less laceration of the ligaments, and contusion of the surrounding parts; while, in the second, we have, associated with the dislocation, a laceration of, and an opening through, the surrounding soft parts, as in compound fracture.

We may have dislocation, *simple* and *complicated;* the first, as already described; the second, where there is, in addition, some fracture, laceration of the vessels or nerves, or some other complication. Sometimes there is so much laceration and injury of the surrounding parts, as to give rise to inflammation, sloughing, suppuration, necrosis, &c.; and we may even be compelled to resort to amputation. This kind of dislocation, then, may vary exceedingly, both in character and result.

Having thus pointed out the varieties of dislocation, let us, in the next place, briefly consider what are its *causes*. At first view, we might be disposed to attribute dislocation to external violence alone; but when we consider it philosophically, we find that, though this is the chief cause, there are others which are sometimes of great importance. They all may be comprehended under the two heads of *predisposing* and *exciting* causes. The first are of comparatively little importance, and I would only remark, that individuals differ exceedingly in the degree of their *liability* to dislocation. In some, great force is required; in others, very little. I would also remark that one dislocation predisposes strongly to others at the same joint; so much so, that muscular action, aided by position only, will sometimes suffice to reproduce the dislocation of a bone which has once already been in that condition. This is particularly the case in the lower jaw, where the simple act of yawning will suffice, in such cases, to throw the head of the bone from its cavity. But, for obvious reasons, it is not necessary to dwell longer upon this division of the subject. The *exciting* causes I may sum up in a few words. They consist of external violence, combined with muscular contraction, though direct violence is often of itself sufficient.

It is necessary that I should state to you, as another element of importance in this discussion, that the number of collateral circumstances, or coincident accidents, are various. As a general rule, there is, in the first place, a *contusion of the surrounding parts;* in the second place, a greater or less *laceration of the capsular, and other ligaments of the joint;* and thirdly, an implication of surrounding organs, *laceration of blood-vessels, nerves, &c.*

The extent of these complications will be various in different cases. In consequence of the laceration of blood-vessels, we will have an *extravasation of blood* into the joint and the cellular tissue, and the force may be sometimes so great as entirely to destroy the vitality of the part; and thus, from the violent contusion alone, *sloughing* may take place, and, as a consequence, extensive *traumatic hemorrhage* be produced, which may even result in death.

Pain always accompanies this injury. It may sometimes be so great as even to throw the patient into a state of collapse. This may pass off in a few moments, or, where the injury is great, and the nerves weak, may sometimes continue so long as to cause reasonable fears for the life of the patient. It is, for the most part, however, followed sooner or later by reaction. Sickness of the stomach, flushed face, &c., will come on; and finally irritative fever may set in, varying in degree of severity, according to the extent of the injury. These are the *constitutional* results of dislocation. But when the bone is allowed to remain in its abnormal position, a series of *local changes* of the greatest importance takes place. The coagulum of blood is absorbed, and its place is occupied by lymph, which both fills up the cavity of the joint, and infiltrates itself into the surrounding parts. A gradual organization of this plasma follows; and, after some time, we find a new articulation formed for the head of the bone in its abnormal position. In process of time, the organization of plasma will gradually give rise to the formation of an adventitious capsular ligament, and some degree of motion may obtain in the part, restoring to the patient, in some measure, the use of his limb. In dislocation of the humerus downwards into the axilla, adhesions may form to vital parts, and exceedingly dangerous results may accrue from any attempt at reduction. It is important that you should bear this in mind. Such attempts have been followed, on the one hand, by extensively diffused traumatic aneurism, and, on the other, by paralysis, from injury to the nerves. On the present occasion, I merely mention this important circumstance, and now pass on to consider the *symptoms* of dislocation. To enter into details concerning these, would be obviously unnecessary at this part of our subject, as it would be again requisite to do so, when we come to speak of the *particular dislocations*. It will suffice here, for me to say, that we have a greater or less extent of deformity, or displacement, and more or less inability to use the part.

We now come to the most important division of our subject—the consideration of the *treatment* of dislocations. The main indication to be fulfilled is evident. The bone having been removed by some force from its natural position, must be restored to the same. This is to be done by force, applied in a proper manner; and in fulfilling this main indication, we should, in the first place, see that the force be applied in the proper manner, and in the proper direction; and, in the second place, we should bear in mind the obstacles to be overcome by that force, aided by other means. As regards the application of force, I may in general terms remark, that it is to be conducted in precisely the same manner as in fractures; by extension and counter-extension—the first being applied to the periphery, the second to the body. The *direction* in which these are to be applied will depend on various circumstances, which can be considered only when we pass in review the individual cases of dislocation.

Prominent among the obstacles to be overcome in the reduction of dislocation, we must remember *rigidity of the muscles*. Hence the means for producing relaxation, constitute an important part of our treatment. Sometimes other obstacles to the return of the bone will present themselves. In the shoulder joint, for example, the capsular ligament may be so torn, or slit, as to encircle, constrict, or gird the bone in such a manner as to oppose its return; and in the phalanges, the tendons of the muscles may get hitched over the rounded protuberances on the face of these bones, and thus constitute an obstacle to their reduction. Again: when the bone has been long removed from its natural position, *adhesion to the neighboring parts* may have taken place; and these, it becomes necessary to break up, by imparting a certain rotatory direction to the force employed.

The means of overcoming muscular action, as I have already said, constitute an important part of our treatment. These are, mostly, already known to you. They are blood-letting, nauseating agents, and anæsthetics. You all know that the stoutest man will grow pale and weak, and that all his muscles will be relaxed, under the influence of the first of these means. Sit your patient then erect; tie up his arm; bleed him *ad deliquium*, and then apply your force. You are all acquainted with the debilitating and prostrating effect of nausea. If necessary, produce this state, and tobacco will be here found a powerful agent in those not accustomed to its use; though I apprehend, that in our country, few such will be found. Fortunately for humanity, we are in modern times supplied with agents, which are far more powerful and safe than either of these. I mean, as you no doubt understand, those agents, chloroform, ether, &c., which not only place the patient entirely under our control, but at the same time render him unconscious of pain. Our only misfortune is, that in all instances these agents cannot be used; as in cases of affection of the brain, heart, or lungs. Still, these agents are applicable to so great a number of cases, that the human race owes a debt of gratitude to the inventors, for which it can never repay them.

When you determine to use the anæsthetic agents, you should induce their full effect. Your patient will thus be relieved from all suffering; and you will also have gained another important point: all motion on the part of the patient, by which the operations of the surgeon are opposed, almost involuntarily, are put an end to. And I may here remark, that when it is inadvisable to use these agents, this last object may be obtained by so diverting the patient's attention, and, as it were, taking him by surprise, as to accomplish your object before he is aware of what you are about.

The degree of force to be used in the reduction of a dislocation is, of course, very variable. Sometimes the mere manual exertions of the surgeon will suffice; or the assistance of one, two, or more individuals may be required: while sometimes it will be necessary to resort to instrumental assistance, such as the compound pulley, and other means which will be shown to you at another time.

In this connection there is still one point of importance which remains to be discussed. When a dislocation has remained for a certain time unreduced, it becomes inadvisable to attempt to restore the part to its natural position, on account of the changes already described as taking place under these circumstances; and this important question presents itself for our determination—how long after the accident can the attempt at reduction be made with safety to the patient, and reasonable hopes of success? If we refer to books and reports on the subject, we find that dislocation of the *shoulder* has been said to have been reduced after ***six months***, and that of the *hip* after *four*. As regards the shoulder, if you will recall what I have said, you will perceive, that after such a time has elapsed, the danger to the axillary nerves and vessels must be very great from the application of much force. As I have already stated, evil has frequently been the result of such measures. The axillary nerves have been torn out by their roots from the spinal cord, and the axillary artery torn across. Be chary, then, in your attempts at reducing the shoulder joints after a long time has elapsed. Three months for the humerus, and six weeks for the femur, may be set down as the utmost limits, within which an attempt at reduction should be made. Should you even succeed in removing the bone from its abnormal position, after such a period has elapsed, you may find the natural cavity filled up by adventitious deposits.

After reduction has been accomplished, it may be necessary, as in fracture, to make use of some retentive apparatus, splints, bandages, &c., such as will be suggested to you by each individual case.

In the time that still remains to us, gentlemen, I propose to commence the more particular discussion of our subject, by calling your attention to the

Dislocation of the Lower Jaw.

Its articulation, as most of you are aware, is an example of the *ginglemoid* or *hinge joint*; and if you examine the parts, you will perceive, that the only direction in which this bone can be displaced, is forwards, the chin being thrown downwards. When the dislocation takes place on both sides, the chin will project most, and the patient be totally unable to close his mouth. If it is limited to one side, the chin will fall down and be inclined to one side. You might suppose, at first, that the reduction of this dislocation would be very easy; but we are sometimes disappointed in our attempts: and you may even fracture the bone, if you apply force, as in old times, directly to the chin. If, however, we reflect on the indications to be fulfilled, and on the anatomical arrangement of the parts, the reduction becomes more simple. If, instead of applying force directly to the chin, we use this as the arm of a lever, the fulcrum of which is formed by our thumb passed into the mouth and pressed on the angle of the bone behind, and raise the chin up, pressing down, at the same time, with the thumb, the action of the muscles themselves will throw the head of the bone into its glenoid cavity with some degree of force. If you wish to avoid the risk of being bitten, you may protect your thumbs by means of lint. Some have used pieces of cork, placed behind the teeth, instead of the thumbs. I have never, however, experienced any injury from this source. The four-tailed bandage should be applied after the reduction, and be worn for two or three days. This should be particularly enjoined on your patient, as some liability to spontaneous dislocation will be produced by a repetition of the accident. We will continue the subject of dislocation at our next meeting.

LECTURE XXVI.

DISLOCATION CONTINUED—OF CLAVICLE—HUMERUS—TWO BONES OF FORE-ARM TOGETHER—RADIUS AND ULNA SEPARATELY.

When we examine the claviculo-sternal articulation, we are struck by the fact, that the articulating surfaces merely rest in contact with each other. These surfaces, then, must oppose but little if any resistance to forces tending to separate them; and were it not for the strong ligaments which bind them in their places, especially the costo-clavicular ligament, dislocation of the clavicle would be very common indeed; whereas, in reality, it cannot take place without the rupture of some of these ligaments. We meet with three dislocations at this joint. The head of the bone may, in the first place, be thrown upwards; in which case the shoulder will be thrown forwards: secondly, it may be dislocated *forwards*; and here the shoulder will fall down and a depression will be perceived where the head of the clavicle should be, a prominence being also perceived on the sternum: and thirdly, we may have the bone displaced directly *backwards*; though this latter is of very rare occurrence. In this case the shoulder will be thrown forwards, and the head of the clavicle, going backwards, will encroach on the trachea, throw it out of place, and impede respiration by narrowing its capacity; and, by pressure on the jugular vein, it may also impede the return of blood from the head.

In all of these cases, there will be no difficulty in recognizing the nature of the accident; and the reduction will be easily accomplished, by carrying the shoulder upwards and backwards, and placing the bone in its proper position. The main difficulty will be, to retain it adjusted; for, as soon as you let it go, the weight of the shoulder will throw it out again, if the apparatus for retention be not properly adjusted. I think that the best plan to be adopted in such a case is, to reduce the dislocation as already explained, place a conical pad in the axilla, as in fracture, and secure it by Dessaults' bandage; which, having already shown to you, I need not demonstrate again. This will tend to carry the shoulder backwards, and at the same time to keep it up. A compress should be placed over the seat of injury; and the arm should be kept motionless for several months, and be then used with great caution.

The acromial end of this bone is also but feebly articulated with the scapula. The ligaments of the joint, however, are so disposed, as to make a dislocation here an accident of very rare occurrence, especially in an *upward* direction; for, to produce a displacement of the bone upward, the conoid and trapezoid ligament must be ruptured. A force sufficient to do this, would usually fracture the bone. If the dislocation is *downward*, the acromio-clavicular ligaments must be ruptured. This may be produced by a force applied directly to the end of the bone. If the dislocation is *upwards*, the end of the clavicle will be found riding over the acromion, upwards and backwards; if *downwards*, a depression will be perceived in its natural position, and the end of the bone will be felt below. The reduction is to be accomplished by raising the shoulder, and, by careful manipulation, placing the head of the bone in its natural position, as in the preceding case. Here, too, the same difficulty will be met with in retaining the parts in their normal relation to each other. This is to be obviated in the same manner, and by the same means, viz: Dessaults' apparatus.

We pass, in the next place, to a displacement of far greater frequency, and therefore demanding particular consideration. I refer, as you may rightly suppose, to the

Dislocations of the Humerus.

If you study carefully the anatomical relations of the various parts at this articulation, the capsular ligament, muscles, &c., you will find that there are but two points of escape for the rounded head of the humerus, the socket in other directions being strongly fortified against its passage. First, it may be dislocated *downwards and slightly forwards*, the head resting in the axilla: secondly, it can escape *upwards and backwards*, the head resting on the dorsum of the scapula. You might suppose, from a casual glance, that it may also take place directly downwards; but if the arrangement of the long head of the triceps be taken into consideration, you will see that such a dislocation is impossible. These two, then, are the only points of escape for the head of the humerus. But, starting from these points, it may subsequently be moved in various directions; for we must remember, that from these *primitive* dislocation, *consecutive* or *secondary* ones may arise, as already explained in a general manner.

The dislocation *downward and forward* into the axilla, is by far the most frequent; and from *this* primitive dislocation, various secondary displacements may result. The bone may be so acted on, by the force producing the accident, by muscular contraction,

&c., as to be carried beneath the pectoral muscle, on the ribs, between them and the scapula, or beneath the clavicle; and there are cases on record, in which the head of the humerus has even been driven into the thoracic cavity, through one of the intercostal spaces. Hence, although there are but two leading dislocations at this joint, we divide them into various other kinds: as, first, that into the axilla; second, that under the pectoralis major; third, that beneath the clavicle, &c., &c. In the dislocation upwards and backwards, on the dorsum of the scapula, the bone is so bound down in this position, that there is seldom much secondary displacement

Let us now consider the *symptoms* presented by a dislocation at this joint. First, when the displacement is *downwards and forwards*, we find a depression at the joint, and we can sometimes feel the empty glenoid cavity; and then, examining the axilla when the arm is raised, the rounded head of the bone will, as a general rule, be found there. It is important also to attend to the direction of the axis of the limb. It will have an inclination somewhat out from the side. And, in addition to this, we may have another deformity; for when the head of the bone is placed under the great pectoral muscle, the arm may be directed obliquely backwards. I should state here, that there are other accidents in which a depression may be found at the joint; and in which, also, the change of direction in the arm may occur. In fracture through the neck of the humerus, we may have both of these symptoms. But as soon as you move the arm, you find, in a case of fracture, that you can reduce it at once, while in a case of dislocation considerable force is required; and, if it is a fracture, the deformity will recur soon, after it has been reduced; while, on the other hand, the parts will remain in their natural position, if a *dislocation* has been reduced. In fracture of the neck of the scapula, the same symptoms may present themselves, but the same difference will serve to point out the true state of the parts. In a dislocation *backwards and upwards*, there can be no mistake. The axis of the arm will be inclined obliquely forwards and outwards, and the head of the bone will be felt on the dorsum of the scapula.

All the plans of *treatment* adopted in cases of dislocation at this joint are founded on one and the same principle, but are modified to suit each case.

If the head of the bone is thrown forwards and downwards, there are two, and I may say three, methods by which it can be restored to its position, and generally with ease, particularly if you avail yourself of some of the means of relaxation spoken of at our last meeting. A very simple plan will be, to place the patient on a bed, a sofa, or on the floor, and, drawing your boot, place your heel in his axilla, seize his wrist with your hands, and make extension steadily, carrying the arm at the same time towards the side. In a great number of cases, the head of the bone will slip into the glenoid cavity, and success will be the result of this simple method.

Another equally simple plan is, to place the patient in an ordinary chair; to take your position behind him, with your foot placed on the edge of the chair, so that your knee will be immediately beneath the axilla of the injured side; and, having caused the arm to be extended from the side and traction to be made in that direction by means of assistants, to press the member down on your knee as a fulcrum, using the patient's arm as a lever. By this plan, also, we frequently succeed in reducing this dislocation. When both of these fail, I have often succeeded by the following method. Place the patient on his back on the floor, and yourself above his head; press your foot against the acromion process of the scapula, and, taking his hand, draw his arm directly up, continuing the pressure with your foot. I bring to your notice all of these plans, because, in many cases, you will find that one succeeds when the others have failed. They should, therefore, be tried in succession.

If in either the first or the last plan, you find that you cannot exercise sufficient strength yourself, you may secure a cord to the arm by means of a roller bandage, or a towel, and place it in the hands of an assistant. Some recommend that counter-extension should be made, by causing the assistant to seize the opposite wrist, and make traction in a direction at right angle with the body, while the surgeon is at the other side. The opposing forces operate through the *trapezii* muscles. When extension is made directly on the injured side, it will be well for the surgeon to place his knee under the humerus, so as to be able to force the head up. A very good way of doing this also, is for the surgeon to pass a band over his neck, and beneath the afflicted arm, by which means he can command a very good leverage on the head of the humerus by raising his shoulders up. In many cases, however, these methods of applying the force will fail. You then should take a sheet, table-cloth, or band of some kind, and, passing it obliquely under the axilla of the affected side, carry it round the body, and attach it to a post, or stay of some kind. This is for counter-extension. Then, take another band, (and in applying this take care to protect the skin,) and secure it above the elbow joint, though some say that this should be applied to the wrist. I prefer that it should be secured above the elbow, as then the fore-arm can be flexed, and used as a lever for rotation. This band is for the purpose of extension; and with that object it is placed in the hands of assistants, who are by means of it, to apply a steady traction, at right angle with the body, and in a direction exactly opposite to the counter-extension band. The surgeon then, by means of his knee, or the strap round his neck, throws the head of the bone into its place. If all these plans fail, it will be necessary to resort to the compound pulley. When the accident, however, is of recent date, and adhesions have formed, I need not again remind you of the great danger that threatens the axillary nerves and vessels from the application of too much force; and if the subject is much debilitated, and there is reason to suspect that the bones are fragile, I would also advise you not to apply too much leverage power on the humerus, for fear of producing a fracture. After the reduction, all that will be necessary is to carry the arm for a short time in a sling, and, sometimes, to prevent motion, it may be advisable to apply a bandage.

We have said that the direction of the forces used in reducing dislocation at this joint, should be modified in accordance with the nature of the dislocation. If the head of the bone be thrown backwards and upwards, on the dorsum of the scapula, which, if you recollect, was stated to be the only other *primitive* dislocation that could occur, the counter-extension should be made, as above, from beneath the axilla, and round the thorax; and the extension should be directed outward, and slightly forward, and should be steadily continued until the head of the humerus is sufficiently disengaged from its new position, when the lower part of the arm should be suddenly moved backward, so as to throw the upper portion forward, into its natural position. When the dislocation is very far forwards, a like method should be pursued, but in the opposite direction.

We pass now to consider

Dislocation at the Elbow Joint.

As you are aware, this is an example of the hinge joint, and is formed by the ends of three bones.

We find it convenient, therefore, to consider dislocation here, first, as it involves *both bones* of the fore-arm, and secondly, as it is confined to *one of them*. So far as a dislocation of *both bones* is concerned, we find that there are but three directions in which they can be displaced. The first of these is directly backwards; in which case, the coronoid process of the ulna will be lodged in the fossa magna of the humerus, the olecranon process will be prominent on the back of the arm, and the fore-arm will be slightly flexed. The *second* and the *third points*, at which the dislocation of the two bones can occur, are, respectively, to the *inner* and to the *outer* sides; in which cases, the displacement is never complete, except in some rare instances, in which the soft parts are very much torn, and the diagnosis will be rendered a matter of little difficulty, by the prominence on one side or the other, as the case may be. In the reduction of the dislocation backwards, different plans have been recommended by different surgeons. Some advise simple extension and counter-extension in the direction of the axis of the arm, assistants performing counter-extension at the shoulder, while the surgeon extends from the wrist. If you bear in mind the fact that the coronoid process is, as it were, *hooked* into the fossa magna, and bound there by tendons, you must at once perceive that this plan is founded upon erroneous principles, and that the reduction had better be conducted in a far different manner. Place yourself on the side of the patient, who may be on a chair or bed; take his arm in one hand and his fore-arm in the other, and place your knee in the angle of his elbow. Then flex his fore-arm, or *wrench* it, as it were, across your knee, and the reduction may easily be accomplished. Another plan is to place the patient near the bed-post, and flex the arm directly around it. The post acts as the knee does in the first mentioned plan. There is still another method, proposed by Professor Dugas, in which the muscles are made to act the principal part in the reduction. This method causes the olecranon process to act as a fulcrum in lifting the coronoid process out of the fossa magna. The arm is placed on a hard table, so that the fore-arm may project; and the fore-arm is then seized, and pressed directly down in extension till the coronoid process is disengaged, when the action of the *brachialis anticus* muscle draws it directly to its normal position. I have never been under the necessity of resorting to this plan, as I have never met with a case in which I could not succeed by flexing the arm across my knee. In one case three months had elapsed, and adhesions had formed. There will be no difficulty in the reduction of the lateral dislocations. Simple extension, counter-extension, and pressure out or in, as the case may be, will generally succeed. The two bones, as I have said already, cannot be dislocated forward, without fracture of the olecranon process: nor can the *ulna* be dislocated *forward* without the same complication; and if it be dislocated *backward*, the appearance, symptoms, and treatment will be the same as if both bones were dislocated in that direction.

The *radius* may be displaced either forward or backward; and the question presents itself—how can these two accidents be distinguished, the one from the other? If it is displaced forward, there will be a depression where the head of the bone should be; and this depression will be especially evident, when the arm is in a semi-flexed position; beyond which it can be flexed no more, from the obstacle presented by rounded head of the radius coming in contact with the humerus. This limitation of motion constitutes another symptom. The *hand* will be placed in supination. If the dislocation is *backward*, the hand will be pronated, and supination cannot be fully accomplished. There will also be a depression in the place naturally occupied by the radius, and its rounded head may be detected behind. In either case I do not think the reduction will be found a difficult matter. We place the patient in such a position, that his arm can rest on a table, and his fore-arm extend over its edge. The arm is to rest on the inner condyle, and it is to be held firmly to the table by the assistants, and *kept* resting on the *inner* condyle. The surgeon then takes hold by the wrist, and using the whole of the ulna as a lever, he makes extension and counter-extension; when, having by this means brought the radius to a proper level, he presses it either forwards or backwards, as the case may be. Having effected the reduction, the fore-arm is to be flexed on the arm, and a paste-board splint is to be put on to prevent motion, and be worn for some time.

LECTURE XXVII.

DISLOCATIONS CONTINUED—AT WRIST JOINT—OF PHALANGES OF THUMB AND FINGERS—AT HIP JOINT.

I have already mentioned, incidentally, that *dislocation at the wrist joint* was an accident of very rare occurrence. I endeavored at the same time to impress upon you the fact, as I believe it to be, that many fractures at the lower end of the radius, have been treated for dislocation of the carpus. If you examine the parts you will readily perceive how difficult it would be for the accident to occur. *Laterally*, the styloid processes of the radius and ulna are situated, and must in most instances be fractured, before the wrist can be displaced to either side. The anterior excavation is filled up by strong tendons, fortifying the joint in *that* direction, and almost preventing entirely a dislocation in that quarter. Behind we have a similar arrangement, and it is almost impossible for it to occur in *that* direction. So it is evident, that dislocation, either forward or backward, must be of rare occurrence. Yet in your books you will find the two dislocations laid down as common accidents. If a case of the kind should come under your care, a careful examination of the joint will reveal its nature to you. If the dislocation is *backwards*, the radius will project into the palm and the carpal bones form a prominence on the back of the hand; if it is *forward*, the reverse will be the condition of the parts, the radius will project behind, and the carpal bones form a prominence in front. The reduction will be easily accomplished. If the displacement of the carpus is *forward*, the hand should be extended and bent backwards, and the end of the radius pressed into its position; if it is *backward*, the same extension should be made, but the hand should be bent forward, and the end of the radius, as before, pressed into place.

If the displacement should be *lateral*, extension and lateral pressure will restore the parts to their normal relations.

Dislocations of the Phalanges of the Thumb and Fingers,

Frequently give a good deal of trouble to the young practitioner; and even the most experienced surgeons may sometimes be baffled in their endeavors at reducing them. I shall therefore explain to you the cause of the difficulty. If the thumb, for example, is dislocated at the first phalanx, the tendons of the *flexor brevis pollicis, adductor pollicis, abductor pollicis, &c.*, and the *lateral ligaments* of the joint become hitched over the rounded protuberances at the base of the first phalangeal bone, and the more we extend and counter-extend the thumb, the more they are stretched, and the tighter are they hitched.

Thus they oppose the extending force, and create a difficulty in the reduction, which is sometimes almost insurmountable to those attempting it by simple extension and counter-extension. The relaxing of these ligaments and tendons, should be your object; and this may be accomplished by flexing the thumb still more, when, by applying your extension and counter-extension not exactly in the axis of the thumb, and gradually bringing the bone up and back to its place, the reduction may be accomplished. This refers to a dislocation *forwards*. If it is *backwards*, instead, in the first instance, of *flexing* the thumb, it should be extended, and then gradually brought to its position. It has been proposed by some to cut these ligaments, but I do not know that you will ever be under the necessity of doing this.

The same difficulty will be met with in all of the phalangeal bones, and it should always be met in the same way.

We will now pass to the dislocations of the lower extremity, and commence with

Dislocation at the Hip.

As in the case of the humerus, the femur can escape from its articulation with the os innominatum at but two points, *upwards and backwards*, and *downwards and forwards*. These are the *primitive* dislocations, though this bone is also liable to be drawn more or less from the place to which it originally escaped. The first mentioned accident is the most frequent. The head of the bone rests on the dorsum of the ilium; the foot is turned in, and the limb is shortened to the extent of two or three inches. The *trochanter major* is turned forwards, and the foot, turned inwards, as just stated, rests upon the meta-tarsal bone of the great toe of the opposite side.

In this dislocation the head of the femur may be sometimes drawn *into the greater ischiatic notch;* in which case, the toes of the injured side will rest upon the articulation of the meta-tarsal with the first phalangeal bone of the great toe of the opposite foot, and the trochanter major will lodge against the edge of the acetabulum.

Some contend that there will be shortening, others affirming that there will not. If you examine the relative position of the parts, you will find that the head of the bone, when in this place, rests a little higher than the acetabulum, and therefore slight shortening must be the result of the displacement. This injury may be mistaken for a fracture, but the difficulty of motion should enable you to distinguish it from that accident. When the *second* of the two primitive dislocations occurs, the bone may also occupy one of two positions, *downwards and forwards into the foramen thyroideum*, or directly *forwards on the ramus of the pubis*, where the head may be perceived under Poupart's ligament, and the hip will appear somewhat flattened. If the bone occupies the *first* of these positions the limb will be rotated outward, and it will be impossible to bring it in towards the sound one. If the bone lies on the *ramus of the pubis*, the character of the deformity, as above mentioned, together with the appearance of the head under Poupart's ligament, will satisfy you of the nature of the accident.

It has been said that the femur has been dislocated directly *downwards on the ischium*, but I apprehend from the anatomy of the part, that this is very improbable. The accident, if it *should* occur, would be characterized by the unnatural length of the limb.

In attempting the *reduction* of dislocation at this joint, it is a matter of the highest importance that you should bear in mind the *muscular influence* which is brought to bear on the bone. From the immense force of the muscles which exercise this influence, it seldom happens that mere manual power is sufficient to overcome their action.

I shall explain the methods followed generally in the reduction of dislocations of the femur; premising, however, that I do not consider them founded upon correct principles, and that I prefer the plans which I shall afterwards explain. This plan makes use of the muscles themselves, and causes them to assist in effecting the reduction, instead of overpowering them by mere force.

In the dislocation *upwards and backwards* on the dorsum ilii, the direction of the extension (which is performed by means of an extension and a counter-extension apparatus, such as you see here, the first secured above the knee, and the second passing under the tuber ischii, a compound pully being generally used) is oblique, and it is continued until the muscles are exhausted by the steady traction. The thigh being flexed towards the abdomen by the forward obliquity of the extension, the surgeon continues rotating it quickly, and when the bone is sufficiently brought down, by means of a strap, he lifts the thigh so as to let it slip into place. If the apparatus which you see here, is not at hand, you may make use of a sheet folded cravat-like, and extend, by means of a roller bandage, always taking care—and the same caution may be given in reference to any apparatus—not to injure the skin in its application. In the *other* dislocation backwards, that *into the greater ischiatic notch*, the same plan is followed.

In the dislocations *forwards on the ramus of the pubis, or into the thyroid foramen*, extension and counter-extension of the axis of the limb, are of no use. The pelvis of the patient is secured, and extension is made *laterally*, by means of a strap passed round the thigh, and attached to a compound pulley. The surgeon in the meanwhile holds the foot in, and carries it also towards the other limb. These are the *ordinary* means, but I here show you the apparatus of Jarvis, as it is called; an ingenious, but complicated affair. The piece like the letter U, with the cushion at the open end, is for counter-extension. By winding the instrument up we obtain extension and counter-extension at the same time; and, by means of the lever we force the bone out. By certain modifications of the instrument we may use it for other dislocations.

As I have already stated, however, I prefer the plan which I will now proceed to explain; and in which the muscles are made instrumental in the reduction.. In the first place, in the dislocation upwards and backwards, on the dorsum of the ilium, the *rotator* muscles are put on the stretch. Bearing this in mind, let us consider what would be effected by *flexing the thigh on the body, and the legs on the thigh.* If you recollect the origins of these muscles, and their common insertion into the digital fossa, you will readily perceive, that by the flexed position of the femur, their influence is brought to bear upon the upper extremity of the bone in a more perpendicular direction towards its axis, and, consequently is exerted to much greater effect. In fact, with so much effect is it exerted, as to draw the head of the bone down towards the acetabulum; and you accomplish the reduction, then, by simply raising the head up to clear its edge, at the same time applying a rotatory motion. Thus, without any compound pulley, or any complicated apparatus, you may succeed by taking advantage of the very muscular action, for overcoming which these apparatus are employed. The method is not a new one, but is a century old; and yet you can hardly take up a medical or surgical journal, without seeing some allusion to the "new method of reducing dislocation of the femur upwards and backwards."* You merely strap the patient's pelvis to a table, and standing over him, flex his thigh upon his abdomen, and extend upwards as you stand. In the other dislocations at the hip, it has lately been proposed to place the patient on his back, and make extension and counter-extension latterly by means of a strap passed under the thigh, the pelvis being secured; and that the surgeon should take the foot, and draw it across to the opposite one, rotating the limb at the same time. But as I am encroaching upon your time, I shall not tax your patience any longer. At our next meeting, I shall pass on to the other dislocations of the lower extremity.

LECTURE XXVIII.

DISLOCATION CONTINUED—OF PATELLA—AT KNEE—AT ANKLE JOINT—OF ASTRAGALUS—OF PHALANGEAL BONES OF TOES—COMPOUND DISLOCATION—DISLOCATION CONCLUDED—AFFECTIONS OF, AND INJURIES TO, JOINTS—WOUNDS OF JOINTS—INFLAMMATION OF JOINTS.

It sometimes happens that the *patella* is displaced from its natural position, where it plays over the joint, and thrown to the inner, or the outer side of the middle line. Where the axis of the limb is much changed from a straight line, as in those commonly called "bow-legged," there may be a considerable pre-disposition to this accident. The diagnosis of such an injury will be a matter of no difficulty. There will be considerable pain; and a tumor of the form of the patella will be seen on the inner, or the outer side of the knee, according to the direction of the dislocation. A depression will be evident in the natural position of the bone; and there will be inability, on the part of the individual, to extend the leg. An important indication to be fulfilled, in accomplishing the reduction, will be, as you may readily suppose, to relax the large extensor muscles of the front of the thigh, which have their common insertion into this bone. This may be readily accomplished by simply flexing the thigh on the abdomen, and extending the leg on the thigh; and, having thus relaxed these muscles—or, as they are together called, the quadriceps extensor femoris—there will be no difficulty in pressing the bone with the thumb, over the condyle, into its position. It will be advisable to make those who are subject to this accident wear a laced knee cap.

---

* This method has been taught in the Lectures, annually, for eighteen years.

Dislocation at the Knee

May take place in any direction, but will hardly ever be complete, on account of the extent of the articulating surfaces. If, for example, the dislocation is *inwards*, the lower end of the femur will rest on the outer fossa of the tibia. There will be no dislocation without considerable laceration of the strong ligaments of the joint; and in consequence of this, the great obstacle to the reduction is removed. All that is necessary in such a case is, to apply slight extension and counter-extension, and press laterally, in or out, as the case may be. It is always rendered a serious accident on account of the laceration of the ligaments, the extent of the injury to the synovial membrane, and the consequent inflammation of the same. We go on, in the next place, to the

Dislocation at the Ankle Joint.

Lateral displacement cannot occur without fracture of the internal or external malleolus—an accident, I may remark, of not at all uncommon occurrence. The only dislocations, then, that can occur without fracture, are those *backwards* and *forwards*. In either case, there will be no difficulty in forming the diagnosis. When the lower ends of the bones of the leg are thrown forwards, on the anterior tarsal bones, the foot will appear shorter, and the heel longer than natural; and when, on the other hand, they are thrown backwards, the foot will appear elongated, and the heel shortened. In neither case will there be much difficulty in effecting the reduction. Should the *tibia* be thrown *forwards*, the surgeon, with the palm of his right hand on the heel of the patient, and his left hand on the instep and toes, extends the limb till the surfaces of articulation are in a line with each other. Assistants, in the meanwhile, keep up counter-extension at the knee; and then the surgeon elevates the toes and depresses the heel, forcing the bone back at the same time. In dislocation *backwards*, the same plan should be followed, with the exception, that the heel should be carried in the opposite direction.

Dislocation of the Astragalus.

It sometimes happens, that, from great violence, the astragalus is thrown to the inner or the outer side of the other bones of the tarsus; and you may, in some cases, find it exceedingly difficult, or even impossible, to reduce it. If there is not much laceration of ligaments, the bone will be tilted up, so as to receive, on one edge, the whole weight of the tibia. All that we can do in such a case, is, to make extension from the foot, with counter-extension from the leg, and to endeavor to press the bone into its place. But sometimes, as I have said, this will be impossible; and then all that can be done, after having made such attempts, is to keep the patient quiet, until he is strong enough to walk. When the astragalus is dislocated from the naviculare, the nature of the accident will be readily perceived. Its reduction can be easily accomplished by slight extension, counter-extension, and pressure; and it will be well, in these cases, to put on the immovable apparatus, consisting, as has already been explained, of repeated layers of starched bandages. In

Dislocations of the Phalanges of the Toes,

The same difficulty will be encountered as in those of the fingers; and the same method should be followed in overcoming it. The toe should be first flexed, or extended, as the displacement is forward or backward—in order to relax the tendons and ligaments which are hitched around the tuberosities at the heads of the phalangeal bones; and in short, precisely the same treatment is to be adopted, as in the like accident to the phalanges of the fingers.

Compound Dislocation.

In all dislocations, where the accident assumes those characters which I have mentioned as constituting a case of compound dislocation, you have a serious injury to deal with. The tissues of the joints invariably take on an intense grade of inflammation; and tetanus may, in some cases, supervene. Amongst these accidents, none are more serious than those which occur at the ankle joint; and when you meet with cases of this kind, it will always be a question of great importance to be determined before you begin the treatment, to decide whether, in attempting to save the limb of your patient, you may not jeopardize his life. In forming your determination on this important point, all the circumstances of each case should be carefully weighed. The extent of the accident; the age and constitution of the patient; the circumstances under which he is placed, as regards the atmospherical influences; the kind of nursing he is likely to receive, &c.; his habits and state of health, are all to be carefully investigated, and allowed to exercise due weight in directing the course you should pursue. If the injury is of considerable extent, the patient old, or of bad constitution, and the other circumstances unfavorable, you should not attempt to save the limb, but proceed to the operation of amputation, as soon as re-action has taken place. If, however, the reverse obtains—if the patient is young and of good health, and has the advantages of good nursing, it will be your duty to attempt to save the limb. When you determine upon this course, the dislocation should be reduced; the wound in the soft parts neatly brought together, and united by adhesive strips or sutures if necessary; and the antiphlogistic treatment rigidly enforced, in order to combat the inflammatory action. With regard to the other complications which may accompany dislocation, we shall have more to say at some future period, and therefore pass them by for the present.

By a natural step we proceed, in the next place, to consider some of the

DISEASES AND INJURIES OF THE JOINTS.

Any injury or disease involving a joint, is rendered a complex subject for consideration from the number of structures, which, sooner or later, are implicated. First, we have the vascular heads of the bones; and secondly, the articular cartilages, devoid of blood vessels, but capable of undergoing changes, and of taking on diseased conditions. Thirdly, we have, surrounding these parts, the synovial membranes; and lastly, as appendages of the joints, we also have the ligaments, and the tendons of the muscles, with their bursæ mucosæ, sacs precisely similar to the synovial membranes. In order to investigate the pathological conditions of the joints, we must understand the nature of all these structures; for, owing to their intimate union, it is almost impossible for diseased action to be confined to one of them. Hence arises the great difficulty in understanding the subject.

In considering the subject, an antomical division would be the most natural; but it would involve too much repetition, and occupy too much time; to avoid which, we will go on in the order of the injuries and diseases, commencing with the more simple.

To begin, we will take up the consideration of

Wounds of the Joints.

It is important, in the first place, to divide these into—those which penetrate into the joint, and those which do not, as the prognosis will materially differ in the two cases. Where a simple incised wound is inflicted over the knee, and it does not penetrate the joint, it will be followed by no more unpleasant symptoms, than the same injury any where else; and all that we have to do, is merely to bring the edges together, and unite them. In this connection, however, there is one point in the diagnosis, to which I desire to call your special attention. It is the fact, that synovial fluid, or rather I should say, a fluid precisely similar to that secreted by the synovial membranes, may be seen issuing from the lips of the wound; and this may lead you to suppose that the joint has been penetrated, when perhaps the synovial sac is untouched. In such cases, the fluid comes from one or more of the bursæ mucosæ in the neighborhood of the joint. This is an important point to be borne in mind; for you may form hastily, and communicate to your patient, a greatly exaggerated opinion of the nature of the wound; since, if you were convinced that the synovial membrane had been entered, you would reasonably consider the injury as of a very serious character. When this is the case, violent inflammatory action is apt to come on, even, in some cases, after several days have elapsed. The limb being kept quiet, and the patient suffering no pain from it for some days, he begins to use it, and no sooner is the friction set up on the surfaces of the synovial membrane, than inflammation is engendered thereon, of a violent character, and soon followed by pain, diffused inflammation in the surrounding parts, delirium, and even death, if the inflammatory action is not checked. Hence it becomes a matter of the highest importance, in the treatment of injuries of this kind, that you should be extremely careful, always bearing in mind, that even at a late period, violent inflammatory action may come on.

The edges of the wound should be carefully brought together as soon as possible, (I here refer more particularly to simple incised, or punctured wounds,) and the limb should be kept in a perfectly quiet state; which latter direction should be particularly enjoined on the patient. If you have not a perfect confidence that he will carry out this important injunction to the letter, you had better apply to the limb a splint of sufficient stiffness, to prevent the slightest motion of the joint, and thus avoid the consequent friction of the synovial membranes, a slight degree of which may serve to induce inflammatory action, which perhaps might not otherwise have arisen. As regards the other treatment demanded, I may, in general terms, remark, that the antiphlogistic plan should be carried out, to a greater or less degree according to the symptoms which present themselves. It may be necessary, in some cases, to resort to venesection, and even to repeat that operation again and again; and in most cases leeches should be freely applied. The bowels should be kept open; the function of the skin should be kept up; and anodynes must be used to ensure rest.

If the injury is extensive, the head of the bone comminuted, the soft parts lacerated and contused, &c., it becomes a question, as I have already said, whether you would not hazard the life of the patient, if you attempted to save the limb. If the joint is one of the larger ones, and there is extensive injury to the parts, the attempt would be hazardous, particularly if the patient's constitution be bad, and other circumstances are unfavorable. In such cases, you should resort to amputation, as soon as reaction has taken place. I have seen cases in which, in twenty-four hours, all hope of saving the patient's life was lost.

Let us in the next place, turn our attention to those accidents of the joints, which may result from *spontaneous or internal causes*,—from diseases which may naturally attack the joint. And in the first place, we will consider

Inflammation of the Synovial Membrane.

This, as you know, is a closed sac, secreting an unctuous fluid. When inflammatory action is set up in any portion of this sac, it diffuses itself with great rapidity over the whole surface. When we trace this inflammation, and investigate the consequences which result from it, we find them of extremely different characters. One of the first changes noticed in the part is an increase of vascularity. Then, we may have a modification of the secretion effected. Instead of the natural synovial fluid, *plasma*, or coagulable lymph, is thrown out by the vessels. This, when not mixed with much synovial fluid, may soon coagulate, gradually go through the processes resulting in organization, and form an adventitious layer over the membrane. Or it may organize in shreds, or form a strong band of adhesion. Sometimes it may fill up the cavity of the sac; and, when the organization is allowed to go on, it may limit, or entirely destroy, the motion of the joint, and thus form what is called ***soft anchylosis***. When it goes on a still greater length of time, ***bony deposit*** may take place; and what we denominate ***perfect, hard,*** or ***solid anchylosis*** will be the result. The extravasated fluid, however, may be partly synovial, and partly lymph; and we will have swelling, and distention of the capsular ligament of the joint; or sometimes, the plasma may be very deficient, and the distention may be caused by a purely serous fluid. The plasma may sometimes be found floating in shreds, or flocculi through the fluid. Upon opening into the joint small bodies are let out, partly organized, yet totally disconnected with any living part, and floating in the fluid; and our curiosity is aroused to account for their organization. The plasma, being originally thrown out by the membrane, was, at one time, attached to it, and while thus in connection with the body, its organization was being effected; but, hanging loosely in the joint, by the motion of the fluid, or of the joint itself, it must have been detached in pieces, which then floated freely in the cavity of the joint.

By some modification of the diseased action, in inflammation of the synovial membrane, instead of the synovial secretion, or the extravasation of plasma, *pus* may be eliminated. Generally, however, this is mixed with some synovia. It distends the capsular ligament; which suppurates, if the distension is continued, and the matter is discharged. But, worse than this, it may involve in the suppurative process, the *cartilages* of the joint; and the mischief may even extend to the *osseous structures* adjacent. The term "*hydrarthrosis*," is applied to that species of effusion, in which the fluid is transparent. When the part is smooth, pale, and flabby, it is called "*white swelling*." But such names are apt to mislead. This very condition, called *white swelling*, is not of one constant character, but involves several changes. This is a subject, however, of so much importance, that I shall take it up in the next lecture; when I shall continue my remarks on it, and consider its treatment.

LECTURE XXIX.

INFLAMMATION OF JOINTS CONTINUED—OTHER PATHOLOGICAL CONDITIONS OF JOINTS, AND THEIR TREATMENT.

We remarked to you yesterday, gentlemen, that, in consequence of the close connection existing between the structures forming the joints, it was almost impossible for any pathological condition to effect one of these structures, without sooner or later extending itself to some, or all of the others. Inflammation, for example, of the synovial membrane, may soon pass to the cartilage, and even through it, to the head of the bone; or, first attacking the cancellous structure of the head of the bone, it may, in a short time, involve the cartilage; and the synovial membrane may ultimately be effected.

Having traced, in the last lecture, the pathological anatomy of inflammation of the synovial membrane, before passing farther, it will be convenient to point out the means for detecting such a condition. When we have an acute synovitis, the whole capsule, in the first place, will become distended, and the joint will consequently be swollen; and, if sufficient pressure be exerted with the fingers, *fluctuation* may be perceived. In the case of the knee joint, this will be most distinct when the leg is flexed on the thigh, as the pressure exerted by the tendons of the quadriceps extensor femoris on the synovial sac, will tend to press the fluids laterally, and thus cause a bulging on each side. In the same manner, in the elbow joint, the fluids would be pressed laterally by the tendon of the triceps, and the detection of fluctuation will be thus rendered less difficult. By these means, then, we can easily detect the accumulation of fluid in a joint.

Commensurate with these changes in the configuration of the joint, we have pain of a local character, sometimes acute, and sometimes increasing in severity towards night-fall, and less acute during the day. In some instances, where the attack *is not of a very acute character*, you will find that your patient, when he gets up in the morning, complains that the joint is stiff, and painful. But, after walking, or moving for some little while, he will tell you that all uneasiness has disappeared; and he congratulates himself for being well again. After remaining quiet for some time, however, he will tell you that the stiffness and pain have returned, perhaps with greater severity. This may occur again; and if the patient be not restrained, an *acute* synovitis may be brought about, for every motion of the part will tend to increase the inflammation. In many cases in which there are these changes going on in the joint, there may be no alteration perceived on the surface of the skin. Both its heat and color may be not at all increased. The part may even be of a pale, glossy color. Sometimes, however, the morbid action may extend outward, and it may be swollen and red. These changes are different in different joints, and at different stages of the inflammation.

In these cases—turning our attention now to the *treatment*—the limb should be kept in the most perfect state of rest; the semi-flexed position should be chosen; and even the involuntary action of the muscles should be prevented; as the slightest motion will tend to exasperate the inflammation. You should next determine which of the antiphlogistic remedies to adopt, blood-letting of course being placed at their head. But whether you resort to this *locally*, or *generally*, should be determined by the circumstances of each case. If the patient be strong and healthy, and the inflammation run high, you should bleed him freely, and repeat the venesection if necessary. If the constitutional powers of the patient are low, or the inflammatory fever is not so great, and the symptoms are not so urgent, you should resort to relays of leeches applied around the joint, bleeding from the bites of which may be encouraged by fomentation; or you may use the scarificator and cups. While you employ these means locally, you should not neglect the internal, or constitutional treatment. A due combination of mercurials, antimonials, and opiates should be resorted to; the bowels should always be kept open, or even purged, if the case is urgent. Concerning the purgative treatment, however, there is one thing which must be remembered, and which constitutes an objection to its adoption. The motion necessary in resorting so frequently to the close stool, will greatly tend to increase the inflammatory action in the joint, and should as much as possible be avoided by the use of a bed pan, whenever this can be obtained. You may next resort to the use of blisters, applied on the inner, or outer side of the joint, or even in front. I know that in recommending these I am in opposition to high authority; but I have found such great benefit to result from this treatment, that I do not hesitate to affirm, that its adoption by you will be found beneficial to your patients. To fulfil our expectations properly, the blistering must be kept up for some time. To the same head, we must refer the stimulating applications in vogue. Of these there are a great variety. Antimonial ointment, mercurial ointment, olive oil and aqua ammoniæ in combination, or iodine with lard, may, any of them, be used. Many use a liniment long employed, and known as "Brodie's liniment." It is a combination of olive oil, turpentine, and strong sulphuric acid, in equal parts; and it is to be rubbed on several times a day. A sense of heat, and a slight redness follow its application, succeeded, in a day or two, by desquamation. It is an excellect application, and superior to the ordinary ammoniacal liniment. Its use should be kept up for some time.

When the affection is of the character of rheumatism, or it is associated with a rheumatic diathesis, it will be well to combine with these remedies, such others as are appropriate to that diathesis. The iodide of potassium, with mercurials, alternated with colchicum, should be used.

Whatever be the character of the inflammation, however, you will be able to do but little for your patient, unless you can secure perfect rest for the inflamed part. Few patients will be found able to bear the constraint necessary to obtain this; and hence mechanical means of support should be resorted to. As a splint may produce too much pressure on the part, the roller bandage may be used, and it is often found to be very advantageous. The constriction, applied thus evenly, is found of great benefit. It prevents a determination of blood to the part, affords it considerable support, promotes absorption, and prevents motion by compressing the muscles. But when the case is one of a more chronic character, and changes have occurred which involve considerable injury to the parts, though bandages may give great support, I would not rely exclusively on them, but would use paste-board splints, carefully adjusted. Before they are put on, the joint should be anointed with some stimulating application. Camphorated mercurial ointment, or camphorated spirits may be used. Over this should be placed a layer of soft lint, and then your apparatus should be adjusted. This may be a splint, or the starch bandage. But when you resort to this, or in fact to *any* plan, you should, from time to time, remove your apparatus, and examine the condition of the parts beneath. A variety of splints may be employed. You may use such as are carved and grooved to fit the limb, or such as may be flexed as you desire. In some cases of inflammation of the elbow, or knee-joint, the *angular screw splint* exhibited when we were discussing fractures of the arm, so arranged, that by turning the screw we may break up adhesions at the joint, may be used with great convenience.

In these measures, then, will consist the treatment of the slighter cases of inflammation of the joints. Some of them also appertain to the treatment of the more serious cases, of which I shall presently speak. But in this connection a question arises, to which I should call your attention. It has been gravely proposed, that when the capsular ligament is much distended, it should be punctured, and the fluid drawn off. Now, when we consider the serious character of a wound thus penetrating the joint, and the proneness of the parts to take on inflammatory action, I apprehend that it will be far better to let the fluid remain, and to trust to proper treatment to procure its absorption. I would be very reluctant, in ordinary synovitis, when the fluid is synovia, with or without a little plasma, to adopt this plan. With the same views, I would also condemn the treatment lately recommended, of puncturing, drawing off the fluid, and injecting with a solution of iodine, or some other stimulating fluid. In some cases of *bursal tumors*, unconnected with the joint, you may resort to this method. You may inject a solution of iodine and water, in equal parts, which will soon be absorbed, and a cure will be effected. But where the *joint* is concerned, if you resort to this plan, I would prefer your being guided by other authority than mine.

In my general remarks of yesterday I stated to you, that in the more serious affections of the joint, the disease was not confined to any one of the component structures of the part, but soon extended to most, if not all of them. Before I go on to these, however, I would mention one other pathological condition, which is confined, at first, to the synovial membrane. The membrane slowly thickens, gradually fills up the cavity, and, extending to the sides, gives rise to a spongy-feeling tumor. Here there is no increase in the synovial fluid, but a fungoid degeneracy of the membrane, which gives rise to the soft, spongy feeling. When, in the case of the knee-joint, it progresses backwards and overlies the popliteal artery, so as to receive the impulses of its pulsations, it may be—and, indeed, has been—mistaken for a popliteal aneurism. Where this spongy condition of the synovial membrane exists, as might reasonably be supposed, the cartilage, in process of time, is apt to become involved. It may even, after a while, be entirely absorbed; and, upon cutting into the joint, we may find no vestige of it remaining. The diseased mass may thus lie in direct contact with the heads of the bones, which may then become involved; and ultimately such extensive changes of structure may take place as to create the necessity of amputation.

In some cases, however, and especially in those of a scrofulous diathesis, we find the changes taking place, first, in the cancellous structure of the head of the bone. When, in such cases, we have had the opportunity of an early examination, we find that the first change consists in a deposit of tubercles in the cancellous structure of the bone. Gradually the whole of it becomes involved, and the disease encroaches on the cartilage; which is then affected, not by a tubercular deposit, but by a destructive process of absorption, which may soon remove it entirely. The diseased action then extends to the synovial membrane, and gives rise there to similar changes to those which have already been described as resulting when it arises primarily in that tissue. Tubercular deposit here, undergoes the same changes as in the lungs. It may remain dormant for some time; or inflammatory action may, by its presence, be excited in the surrounding parts, and ulceration results; the tubercles in the meantime going through the stages of softening, and producing suppuration and caries. I have been under the necessity of amputating above the knee joint, when the whole disease arose from the head of the femur or tibia, and affected all of the surrounding parts.

As I intimated, during the lecture of yesterday, the term "white swelling" has been applied to this chronic affection, when the parts present a white and smooth glossy aspect. It is an unmeaning expression; for this condition, instead of being a simple disease, is in reality the result of a number of affections of the joints. In whatever structure the disease begins, you may always rest assured, that you have a serious affection to deal with. There is always a disposition to the gradual destruction of the part, until either the patient is worn out by the disease, or you come to his assistance by amputation, or by cutting off the heads of the bones, provided the limits of the disease warrant the hope of saving the limb.

As regards the treatment of these chronic affections, I have to refer you, for the general rules, to what I have already said. One essential rule is, that you should obtain perfect repose. This is so important, that I take the liberty of repeating it here, although I have already mentioned it as the *leading indication*, and alluded to the means for fulfilling it. Here venesection is unsafe, and even local blood-letting, in cases of long standing, or where the patient is weak, may be inadmissible. But, at first, or when the inflammation is high, a small number of leeches, successively applied, will often be found of benefit. It is in these cases especially useful to keep up a gentle degree of pressure, by means of the proper apparatus, so applied as to be capable of easy removal and re-adjustment from time to time. You may use carved splints; or you may use the immovable apparatus, but *so applied* as to be *removable.* You should leave the anterior part open, by cutting it through longitudinally with a pair of scissors, and thus converting it into a kind of trough. I have often resorted to this expedient, in affections not only of the knee and elbow, but also where the hip was the part involved, and when the disease had extended even to the pelvis. In such cases, the opening to admit of its removal, should be in the side. You will find this suggestion very useful, not only in securing compression, but also in restraining the motion of the parts involved. It is preferable to the carved splints, both on account of its greater convenience, and its being less expensive.

In addition to these measures, it has been strongly recommended, in the *inception* of these diseases, to bring the patient gradually under the influence of mercury. I think, however, that great discrimination should be used in resorting to this plan of treatment. It unfortunately happens, in a great number of these cases, that the disease is engrafted on a scrofulous diathesis; and the administration of mercury, under such circumstances, would be highly injurious. This medicine seems, in such constitutions, to depress or lessen the vital forces of the system. Where the constitution is good, when we have no reason to suspect a scrofulous diathesis and when the disease is in its inception, a slight mercurial course combined with anodynes, will be of service: but it should never be pushed to ptyalism. There are, in this connection, still some other important considerations, which we will be obliged to defer to our next lecture.

LECTURE XXX.

DISEASES OF JOINTS CONTINUED—HIP JOINT DISEASE—ANCHYLOSIS—TREATMENT OF ANCHYLOSIS.

In our preceding lecture, gentlemen, we endeavored to portray the leading pathological conditions of the articulations.

You will remember how we explained to you, that whenever the parts of a joint become affected by disease, the consequences were variable, in accordançe with the number of tissues it involved, and its extent; that, in most cases, the diseased action is not confined to one structure, but extends from the synovial membrane to the cartilages, from the cartilages to the bones, and *vice versa*, spreading in various directions, and sometimes involving the surrounding cellular tissue, and other neighboring structures; and that, the remedies, in these various conditions, were very nearly the same, it only being necessary to modify the treatment according to the acuteness, or the stage of the disease. But, while we intend these general remarks to apply to diseases of all the joints, the subject is one of such importance, that there are some specialities in reference to particular joints, to which we must call your attention, before we leave the subject. I allude more particularly to the hip joint, and we will now consider some of the circumstances referable to this particular part. Here, diseased action almost always involves serious consequences. It is a matter of importance to consider, not only the pathalogical conditions of the joint, but also those changes in the relation of parts, which are apt to result from such conditions. As regards the changes of structure, I need not add to what I have already said in reference to joints in general, but will suppose these changes to have occurred. We find the patient complaining of a pain in the joint, which differs greatly according to circumstances. It is modified by the state of the atmosphere, and it is relieved after exercise, but returns with greater violence after rest. And so the disease goes on, step by step, obscure at first, but gradually obtruding itself upon the notice of the individual. In process of time, a notable change takes place in the outer conformation of the hip. Its *breadth will be found to be increased*, as may be evinced by ascertaining the fact, that a line drawn from the symphysis pubis or the spine of the sacrum to the trochanter major of the affected side, will be longer than a similar one, drawn on the sound half of the body. Accompanying this change there will also be an evident *lengthening* of the affected limb. This can be seen by placing the malleoli side by side; though in thus determining the fact, there is one circumstance which must be attended to, in order to avoid a mistake. The *axis of the body* should be made to *correspond to that of the limb*, or you may fail to detect the lengthening, and may even think that the opposite condition obtains. This is owing to the fact, that the constant effect of the disease is to tilt the affected side of the pelvis up, thus producing an *appearance* of shortening. A line, drawn from the superior spinous process on the injured side to the malleolus, will be found to be longer than one, similarly drawn, on the opposite side.

We find that this change of conformation in the limb and pelvis, has resulted from changes which have already taken place in the joint itself, and which tend to *protrude* the head of the thigh bone from its natural position in the acetabulum. These changes have been variously explained; or, more properly, the reason of the changes in the position of the head of the femur, has been variously interpreted. Some ascribe it to a gradual thickening of the synovial membrane, others to the same change occurring in the cartilaginous structure. It is very probable, that, in certain cases, all of the causes which have been assigned may *concur* in producing the result. But there is one element in the production of the protrusion, which is of great importance. We find that, while there may be important changes taking place in the joint, changes also occur in the head of the femur itself. They generally commence with a tuberculous deposit. The bone becomes more and more distended by this deposit, and gradually increases in size, until it is no longer capable of being retained in the cavity of the acetabulum, when it is thrown out; and then by the action of the muscles it is drawn to the dorsum of the ilium, thus occupying one of the positions of dislocation. In estimating the causes of this deformity, we must take all of the changes at the articulation into due consideration.

There are still other circumstances to be considered in reference to this important subject; and to do these justice, we will follow the disease as it progresses, step by step. The first phase of the affection, is that from its first appearance to the period in which the morbid changes have resulted in dislocation of the head of the femur. Within this limit, then, we will include the *first* stage of *mobus coxarius*, or hip disease. As soon as the dislocation has occurred, owing to the action of the internal iliac and psoas magnus muscles, the limb will be flexed; the knee will be drawn in; and, of course, the gait of the patient becomes considerably altered. These symptoms will evince the *termination* of the first stage; but when we trace that stage from its commencement, from day to day, we find the limb gradually to increase in length, and the thigh to become more and more flexed. These changes progressively advance, until in process of time the head of the bone is protruded from its articular cavity, and is lodged on the dorsum of the ilium. *Now*, instead of finding the limb *lengthened*, we will discover that *shortening* has occurred; and the foot will be found to be inverted (by the action of the iliacus intermus, and psoas magnus muscles,) on the thigh. The thigh of the affected side will be drawn in over the other, and will be flexed slightly; while the patient will be able to walk only on his toes. Thus, there is a change in the axis of the limb; and, to accommodate the centre of gravity to this change, a curve takes place in the vertebral column. These are the phenomena presented by the *second* stage of the affection. The mischief daily extends; and ulceration and suppuration supervenes, the bone being often carious even prior to the dislocation. The surrounding cellular tissue, and other structures, ultimately become involved, and burrowing abscesses are formed. These last changes constitute the *third* stage. Sometimes, either by the conservative forces of nature, or by the aid of art, the affection may be arrested before extensive suppuration has occurred; but we cannot expect the parts to return to their natural conditions, and the patient, though he may recover finally, will be permanently deformed, to a greater or less degree.

Thus, I have endeavored to exhibit the leading changes presented for our consideration, by this most distressing disease. It is one which requires to be continually watched, and in the management of which we are often doomed to fail in our most carefully directed endeavors to benefit the condition of the unfortunate patient. As regards the treatment to be adopted, I may in general terms state, that it consists of a modification of that laid down for the management of diseases of the joints in general. In the early stages, leeches should be applied around the joint; and afterwards revulsives should be resorted to. Stimulating liniments, the moxa or actual cautery, setons, or issues may be employed. Blisters may be used in process of time, particularly when the constitution is weak. Irritative fever, or chills, followed by more or less febrile action and sweating, are apt to supervene; and they so exhaust the system as to require a relinquishment of the antiphlogistic treatment, and to render it necessary to resort to tonics, and a healthy, invigorating diet. There is one point to which I would call your especial attention. As soon as you find a disposition for the bone to escape from the cavity, you should put on some apparatus, by which you may keep up a slight degree of extension and counter-extension, and which will also assist in keeping the patient quiet. Hagerdorn's fracture apparatus may be used. This consists, as already explained, of a long splint to be applied to the sound side of the body, and a foot board with a mortice through it, to which the foot is to be secured. These having been adjusted, the foot of the injured side is brought alongside of the opposite one, and secured to the foot-board. Should there be any objection to Hagerdorn's apparatus, you may use a long wooden splint, to extend from the crest of the ilium to the foot, carved so as to fit the inequalities of the limb, and made of material as light and soft as possible. To this the limb may be strapped, through its entire length. Or, you may use a kind of immovable apparatus constructed of starch bandages and paste-board, filling up the inequalities with soft lint, and extending it from the crest of the ilium to the heel. Apply first a roller bandage the whole length, (protecting the parts by some soft material) and extending also over the pelvis: on this, lay strips of paste-board, and then a layer of starch; then apply a bandage again; and so on, as often as is necessary. The limb should then be placed in a proper position, and all motion must be prevented until the starch has hardened. But as it is a matter of importance to remove the apparatus from time to time, you should remember to apply no paste-board on the inner side of the limb; so that, when the starch has hardened, with a pair of scissors you may cut up to the nates, and turn the apparatus off, as you would the bark from a tree. Thus, the apparatus may be removed and replaced, as often as may be necessary. It is to be secured to the leg and pelvis by means of straps.

There is still, in this connection, one collateral circumstance to which I would call your attention. I have stated that, as a general rule, notwithstanding the high authority against me, I am opposed to puncturing a joint when it is distended by an inordinate accumulation of synovial fluid. But the question arises, whether it would not be well to do so, if the accumulation be of a *purulent* character. I am free to confess, that under such circumstances, I would unhesitatingly puncture, and evacuate the pus; and even if the accumulation again took place, I would repeat the operation. A *purulent* collection, whether located in the neighboring tissues, or in those comprised within the joint proper, should always be evacuated. You should remember, however, that the constitution, previously but little if at all affected by the local disease, may soon become so, from the admission of atmosphere into the cavity of one of the *larger* joints. If it should become expedient to puncture such a joint, you should, therefore, be ready to support your patient, and to fortify his constitutional powers by the use of an invigorating diet, and the judicious administration of tonics, or even stimulants, according to the exigences of the case.[*]

---

[*] The operation of *excision* of the diseased portions of bone in hip disease has been advocated, of late years, with considerable zeal by some, and with equal caution by others. Erichsen limits the operation to those cases in which the head of the bone is removed from its socket, and is carious and irritating to the parts in which it lodges, or to the general system, through the constant discharge from the absceses and sinuses which it gives rise to. Skey says: "This operation is rarely justifiable, or, when performed, answers any good purpose. In strumous disease of the joint, followed by spontaneous disarticulation, the disease appears to have reached its crisis, and the morbid actions subside.

The operation of excision is only indicated in disease of long standing, in which the parts are much attenuated, and when abscesses form about the joint or around the head of the bone. Under these circumstances the removal of the head may be occasionally justifiable." An indiscriminate condemnation of this operation is certainly incorrect. Recent statistics seem to show that it is by no means so fatal *when resorted to in appropriate cases*, as it was formerly thought to be. It is even questionable whether some cases would have survived, if it had not been resorted to. The subject is well discussed by a recent writer, Dr. R. A. Kinloch, in the Charleston Medical Journal and Review for May, 1857.

Dr. K. has here published a table of forty cases. *Sixteen* of these are reported as having *recovered*, with various degrees of usefulness in the limb; *eight* are reported as in a *favorable condition;* thirteen *died* before recovering from the operation—three of these, however, dying from the supervention of other diseases, in one case eight years after the operation—two are represented to be in an *unfavorable* condition; and the result in one case is unmentioned by the original reporter. In the words of the writer, this record "proves the mortality to be much less than can be shown for amputation at the joint; and so far as it pronounces upon the utility of the limb after excision, the verdict is satisfactory."

We should say then, in conclusion, that the operation may be performed for the removal of the diseased head, and as much of the acetabulum as may be diseased and removable, whenever we apprehend that the affection has progressed to such a degree, that a spontaneous cure is to be despaired of; or whenever the head of the bone is removed from the socket, and is still in a carious condition, and so irritating to the parts around as to react upon the constitution; provided always, that the patient still possesses so much strength as to afford us a reasonable *probability* (we can *never be certain*) of his ability to stand the shock. In such circumstances we conceive that the operation affords, the *best chance* for recovery; and the surgeon is bound to give his patient the benefit of that which his judgment

I will not, however, dwell longer on this point, but pass on in the consideration of our subject.

I have already stated, that, owing to diseases of the joints, a certain condition may obtain which is accompanied by a loss of motion in the part, and which is called *anchylosis*. This is divided into *true* and *false* anchylosis. *False anchylosis* is restricted by some to mean that impairment, or destruction of motion caused by disease of the tissues *extraneous* to the articulation. By others, it is made to include all cases in which but *slight motion* is permitted; *true anchylosis* being by these latter considered as that condition in which *all* motion is destroyed. I would prefer re-

---

suggests as most likely to afford a favorable result, *even though in doing so his reputation may run some risk*. In all cases in which the operation should be performed, it will be found that the ligaments of the joint are more or less diseased, or absorbed. But little difficulty will, therefore, be experienced in dislodging the head, and protruding it sufficiently into the incision to admit of its removal by means of the chain saw. Some surgeons advise an angular incision, some a T shaped, and some a semilunar one.

By the first plan, an incision may be "made longitudinally to the extent of about three inches over the trochanter major, and a second incision carried backwards, of sufficient length to expose the neck up to the head. For this purpose the leg must be carried over the opposite limb with some force, in order to facilitate the exposure of the head of the bone, and to bring it within the grasp of the operator. The ligamentum teres being absorbed, the head may be drawn from the acetabulum, if yet retained within it, and the neck divided with a fine saw." This is the description given by Skey, in his "Operative Surgery," American edition, page 374–5. Prof. Erichsen adopts the T shaped incision, and we will quote his description of the operation as performed by this plan. "The operation itself is not difficult of performance; the carious head of the femur, lying at the bottom of an abscess or of sinuses, may readily be exposed by a T shaped incision over it. When it is exposed it may be turned out by drawing the limb over the opposite thigh, and rotating it outwards, when it may be cut off through the neck or trochanter by means of an ordinary saw. In planning the incision, care must of course be taken not to cut too far forwards, lest the anterior crural nerve be wounded, or too freely backwards, lest a gluteral artery be injured. After the operation, the wound must be dressed in a simple manner, and a long splint applied. Mr. Fergusson recommends that the extension by means of the perineal band should be made from the opposite thigh, round the upper part of which a laced stocking is fixed, to which the band is attached. In such cases as these, much advantage, I should imagine, would be derived by the use of the bracket thigh-splint," &c.

Sedillot's operation is performed by means of a semilunar incision, commencing a little in front of the trochanter, carried upwards and backwards, and then backwards and downwards, so as to expose the joint. A strip is then run beneath the neck of the femur, and the chain saw is passed along this, and the bone divided. In all of these plans of procedure, the patient is to be turned over on the sound side, and supported there.—Ed.

stricting the term ***true anchylosis,*** to that condition of parts in which *solid* and *immovable union* has taken place between the articulating surfaces by the deposition of osseous matter. The ***results*** of anchylosis will differ, in accordance with the joint affected; and the amount of inconvenience to the patient will vary, therefore, according to the seat of the disease. When the loss of motion is a matter of great inconvenience to the patient, it becomes an inquiry of importance, whether surgical science can do any thing to relieve this condition of the part. Now, in cases of recent origin, and in those cases in which the union is of a *soft* or *incomplete* character, simple motion of the joint, often repeated, and the adoption of an antiphlogistic treatment, will often succeed in restoring the parts to their natural state of mobility. When the adhesion is still more firm, but yet soft, it may be necessary to resort to an operation of more importance. And here modern surgery has achieved a great triumph. In many cases, which, for a long time, were considered beyond the reach of art, the experience of later years has shown, that we may tear up the bonds of union with impunity, and succeed in improving the motion of the joint, and even, sometimes, in entirely relieving the condition of the patient. It was formerly considered dangerous to disturb the joint, but in modern times it has been demonstrated that we may, without risk, tear adhesions apart, and place the limb in any desirable position. Louvier accomplishes this by means of a screw apparatus. It is not necessary for me to describe this apparatus particularly to you. You can best understand its mode of operation by inspecting it yourself. In operating with it, there is violent pressure exerted on several parts of the limb, at the straps, and at the pad. So much is this the case, that the skin is often violently contused, and sometimes even excoriation and ulceration may result. This apparatus I consider as generally unnecessary, though in ***some*** cases it may be employed with advantage.

As a general rule, instead of adopting this method of Louvier, I would advise that you should merely employ your own muscular power. Let us suppose a case of soft anchylosis at the knee joint, in which the leg is too much flexed on the thigh. At first you might suppose, that I would directly extend the limb. I would adopt exactly the opposite course. Seize the thigh and the ankle, and wrench the latter gradually back. The leg will thus be carried still more into flexion. This will break up the adhesions. The limb should then be extended as far as is desirable, and placed in an immovable apparatus; and the antiphlogistic treatment must be enforced. In difficult cases of angular anchylosis, for example at the knee joint, it may be necssary, before proceeding to break up the adhesions, to divide the tendons of the flexor muscle, and also that of the rectus funoris, by tenotony. Chloroform should be freely used, to prevent pain, and secure relaxation. This operation should *never* be attempted, when there is much inflammation, or after suppuration, tuberculosis, or caries of the bone.

I would not trespass so much upon your time, gentlemen, but there is still one point to which I would call your attention—the treatment of *solid* anchylosis. When this has taken place, with the limb in an inconvenient position, modern surgery has succeeded so far as to restore the limb to a more comfortable state; and, in some instances, even the motion of the part has been regained. Barton and Rogers, two American surgeons, have attempted to produce artificial joints in these cases. The operation of Barton was simply, in anchylosis of the femur to the innominatum, for example to cut down to the bone—below the trochanter major, saw through it, bring the limb straight, and prevent union by occasional motion of the part. The operation of Rogers was of a similar kind.

If the anchylosis takes place in an inconvenient position, we can, at any rate, restore the limb to a more comfortable one. Let us take, for example, a case of the disease at the knee, in which the leg is too much flexed. Here it is not necessary to make an artificial joint, as the patient will be able to walk very well without it, if the leg were only bent at a right angle. In such a case, we may saw out a wedge-shaped piece of bone from the anterior portion of the femur: so that, when the posterior part is fractured, the opposing surfaces may come into contact, and the leg be nearly straight. It should afterwards be treated as a case of fracture, retaining, throughout the treatment, the slightly flexed position of the leg. Upon the same principles, we may treat anchylosis at any of the other joints, choosing the most convenient position for each limb. This is an important advantage gained by modern surgery; for which *it*, and humanity in general, are greatly indebted to Dr. Rhea Barton, who first performed the operation on a native of this city, a professional brother, who I believe still walks with a considerable degree of facility.

LECTURE XXXI.

PATHOLOGY OF OSSEOUS STRUCTURES—INFLAMMATION OF BONE, OR OSTEITIS, ACUTE AND CHRONIC, COMMON AND SPECIFIC, ETC.—RESULTS OF OSTEITIS—OSTEO-SPONGIOSIS—OSTEO-SCLEROSIS — EXOSTOSIS — OSTEO-PHYTA — ATROPHY OF BONE — OSTEO-PYOSIS — MEDULLARY ABSCESS — CARIES, OR OSTEO-ELKOSIS — NECROSIS — TUMORS FROM BONE.

I propose this morning, gentlemen, to pass in brief review the various pathological conditions of bone, involving changes of structure. When we contemplate this part of the organization in its dry state, we are apt to infer that its vital endowments are of such a character as to exempt it, in a great degree, if not entirely, from the pathological conditions of the other structures of the human body. Such an inference is by no means in accordance with the truth. There are few structures in which pathological changes are of more frequent occurrence. Its diseases are precisely the same as those of the soft parts; as I will endeavor, in the course of my remarks, to point out to you.

In the discussion of this subject we find it convenient to adopt the same course as in our consideration of the diseases of the soft parts; commencing with inflammation, and tracing it to its various results and terminations.

Osteitis, like inflammatory action in general, may be divided into *Acute* and *Chronic*, *Common* and *Specific*, &c., as in our general discussion of the subject of inflammation. The inflammation may arise in the osseous structure itself, or in the fibrous periosteum; and it may extend from the one to the other. In considering our subject, let us investigate, in order, the phenomena it presents, its symptoms, and the consequences that follow, or its results. Whenever a bone is exposed to the circumstances which cause inflammation in other parts, we find an increased flow of blood, a retardation of the flow, an increased accumulation of blood in the part, a heightened degree of vascularity, &c., as in inflammation elsewhere, acompanied, also, by an exudation of the same character as that poured out in any other inflamed part.

But here there is one collateral element in the consideration, which it is important to bear in mind. We find, that as soon as active inflammation is set up in a bone, and exudation, with changes in the blood begins, the calcareous portion of the bone is gradually absorbed, so that, in some cases, there is a notable *softening of the bone.* These are some of the local derangements in the vital processes, when inflammation is kindled in any portion of the osseous tissue.

I have already stated, that at some period of the morbid train of actions, as in the soft parts, an *exudation* takes place. This consists of the same material as that extravasated in inflammation elsewhere. At first, it is serous; then, as the inflammation progresses, plasma is thrown out, and this undergoes various changes, and gives rise to a variety of results. Under the most simple conditions, we find that this plastic material produces organic cells; which, grouping together, give rise, in turn, to organized structures, either on the surface of the bone, or within its areolæ. Once the process has reached this point, we find that this new material, as yet soft and pliable, becomes the seat of a new deposit, of an *earthy* character; which, if the whole be not absorbed, will give rise to a great variety of modifications in the *shape, consistency, volume,* and *weight* of the bone. If the whole *is* removed by absorption, the inflammatory action has terminated by "*resolution.*" If it is not absorbed, we find that the bone, under the operation of this law of organization, may, in the first place, be considerably increased as to volume, either with or without a change in its consistency. Where no expansion takes place, its consistency will be increased; and the bone will be more solid and compact. Where the opposite condition obtains, it will become more spongy and porous. Thus, you perceive, there may be several pathological conditions. First, there may be an *augmentation of size, with an increase of consistency;* and this condition will necessarily be accompanied by an *increase of weight.* To this condition we may apply the term *osteo-sclerosis.* Again, while the *volume is augmented, the consistence may be diminished;* and the bone, though *larger,* may be *no heavier.* It is, as it were, *expanded,* like a sponge. Hence *this condition* is called *osteo-spongiosis.* The bone is traversed by pores. It is a pathological condition of great importance.

These are changes produced merely by a modification of the nutritive functions of the part; but it sometimes happens that the inflammation, instead of acting in this manner, is confined within smaller limits; and then it gives rise to *bony tumors,* which will be very variable, as to *size, configuration, consistence,* &c.; but which have this in common—that they all arise from a process of inflammation, however obscure the evidences of that inflammation may have been. Now, when we have such a tumor arising from a bone, we apply to it the term *exostosis—bone growing out of bone.*

These bony tumors differ, as I have stated, not only in size and form, but also in *texture.* Sometimes they are of the nature of the bone from which they spring; sometimes they are softer; and sometimes they are more compact. I have seen such tumors so compact and hard, as to resemble ivory; though by the aid of the microscope, the bony structure could still be observed. These tumors may, again, assume another modification. They may resemble very much lifeless projections standing up from the surface of the bone, which is, as it were, studded with vegetable growths; and hence *this* condition of the surface may be called *osteo-phyta.* The size of the bone is considerably increased, and the soft parts are sometimes so much irritated, as even to lead to a necessity for amputation. Sometimes the disease may consist of a number of minute spines. Such a condition may frequently be detected at the base of obstinate skin ulcers. In these cases, the periosteum is also affected.

But inflammatory action may occasion effects diametrically opposite to these that we have been thus far considering. It may give rise to a *diminution* of size; or, if the volume be unchanged, it may, at any rate, produce a *diminution of consistency*—a loss in the substance of the bone—without a loss of volume, from absorption of its earthy matter. This is *atrophy of bone,* and is precisely analogous to the same condition in the soft parts. You have an excellent specimen of atrophy of bone in this tibia I hold in my hand, which you will find to be so light, that it will float, like cork, upon the water. This deprivation of the bone in its earthy components, if not the result of inflammation, may be caused by some disturbance in the functions of nutrition, which causes the absorbents to act with peculiar energy upon its calcareous portion.

Pus globules may also be formed as the result of inflammation of this structure. Blood may become exuded, and undergo those changes which result in suppuration, which is obedient to the same laws as elsewhere. At first, the corpuscles may be merely infiltrated through the meshes of the tissue; but as they increase in number, they accumulate, and become circumscribed; force aside the softened bony texture; and present all the characters of an abscess. This constitutes *osteo-pyosis,* or circumscribed abscess in the substance of the bone itself. Here, there is one point which

I must bring to your mind in this connection. When we saw open any one of the long bones, we find in its centre, a space, hollow, as regards the dried specimen, but which, in the living state of the bone, is occupied by a peculiar substance, the *medullary matter.* This "medullary canal" is lined by a *medullary membrane,* which also divides the space into a number of minute cells, filled with adipose matter. Now, my reason for calling your attention to this medullary canal, and its contents, is, that pus may first form in these medullary cells, instead of in the tissue of the bone itself. This canal may be the first point of the disease; which may be prevented from extending, as in other parts, by plastic exudation around it: and thus may be formed a *medullary abscess.*

Suppuration, then, and its termination in an abscess, is one of the results of inflammation in the osseous tissue. Wherever this abscess is formed, it is surrounded by such circumstances, that it is interesting to trace the processes by which nature relieves herself of the accumulation. This process, again, is precisely similar to what occurs under like circumstances in the soft parts. Absorption (first of the earthy matter, and then of the soft portion of the bone,) removes gradually the structures interposed between the abscess and the surface; and thus, the cavity may be emptied by the unassisted powers of nature. We have before us many interesting specimens illustrating this principle, in which even *medullary* abscesses have discharged themselves, through small, round openings, made by absorption. In all of these cases the matter may be discharged, as in the soft parts, by the conservative powers of nature. But this is not all. We have, in the next place, to call your attention to a state precisely similar to *ulceration* of the soft parts, and known as *caries,* or *osteo-elkosis.* Now, you may remember that we stated to you, that we attributed ulceration, in the soft parts, to a species of mollecular death. This is precisely what takes place in caries of bone. It dies *by particles;* some of which are thrown off by way of the discharges, and some are taken up by absorption, and carried out of the system in the various secretions. Sometimes the bone, by this means, is completely riddled, and made much lighter than natural. Often small *fragments* or *scales* will become detached, and fall off. This is termed *exfoliation* of bone, differing from ulceration only in the fact, that the death takes place in small masses, instead of particles; though, indeed, this difference is more apparent than real, for if you examine ulceration in the soft parts, especially in what are called sloughing ulcers, you will find that at times small masses become detached, and slough off. This is precisely what take place in exfoliation; small portions at a time become deprived of their life, and are detached. This condition of bone may result from a variety of causes. The scrofulous cachexy, and many of the other diathesis, may be its origin. But of all the causes which tend to its production, there is none of so wide spread an influence, as the combined force of the *syphilitic virus*, and the *mercurial action*. Mercury, it is well known, may be absorbed into the system, and may accumulate, to a considerable extent, in the osseous tissue. Globules of it have been shaken from specimens of deceased bone.

Again; tracing this pathological process, we find that the diseased action may take another turn, and, instead of a molecular death, *extensive portions* may lose their vitality at once; and we have "*necrosis;*" this being a death of a more or less extensive portion of bone at a time. This is the exact counterpart of gangrene, or mortification in the soft parts. Now, this "*necrosis*" will give rise to very different results, according to the part affected, and the extent of the disease. When near the surface, and not very extensive, it becomes detached, and is cast off, as a slough is in the soft parts. But when it is deeply seated, and more extensive, and it not only becomes detached, by its absorption, from the adjacent parts, but other changes of great importance take place in these parts. While the dead portion is being separated, plasma is thrown out around it; which becomes organized, and transformed into bone, thus forming a kind of casement surrounding it. To this, pathologists have applied the name of "involucrum." The interior, enclosed dead bone, they call the "sequestrum." The involucrum is sometimes perforated by outlets, which are called "cloatræ." These are accompanied by corresponding openings in the soft parts, through which the matter escapes.

Besides these results of the inflammation of bone, we have a variety of other consequences, corresponding to the *homoioclyte* and *heteroclyte productions* in the soft parts. Sometimes a fibrous tumor may result, and sometimes one that bears a resemblance to cartilage; when the affection is called *osteo-chondrosis.* This may be of such a size, and so situated, as materially to disturb the neighboring parts, or prevent the motion of a joint, sometimes even rendering the removal of parts necessary. It sometimes occurs in the *internal* portion of the bone. Those tumors of a fibrous character may also form in the interior of the bone; and sometimes one may be found *perforating* the osseous substance in canals. When abnormal deposits of this character are diffused through the bony texture, pathologists have long been in the habit of applying to the parts thus affected, the epithet of "*osteo-sarcoma*," *bony flesh*. I should state to you, that this term is a very inaccurate one, as it is applied to various different conditions. Were it applied only to those cases, in which the cells of the bone are filled with an organized fibrous structure, it would be definite enough; but often the new matter bears no resemblance whatever to flesh, and sometimes it consists of *living animals*. It is sometimes of an *encephaloid*, or *medullary* character; and, unfortunately, a malignant deposit often takes place, which has no prototype in the organization, and which possesses this peculiarity, that, though it may remain a long time dormant, it springs, under certain circumstances, into vigorous action, and progresses with a fearful rapidity, which soon leads to fatal results. This is cancer, medullary, encephaloid, or otherwise. I repeat, then, that this term, *osteo-sarcoma*, is a very loose and inaccurate one.

The *animalcular collections*, sometimes found in bone, are hydatids, being composed of simple cysts. In some cases, a projecting point may be discovered, forming a kind of head; while in other cases, they consist simply of a membranous cyst, filled with a watery fluid. In both instances, they possess the power of multiplying themselves; and by this means, they encroach upon the surrounding bony structure.

Such, gentlemen, are, in a general point of view, the pathological conditions to which the osseous system is liable; and if you have followed me in this imperfect sketch of the diseases of the bony tissue, you will see, that from the first, I have been explaining a series of changes precisely similar to those taking place in the other structures of the body. Commencing with inflammation, we have followed it, step by step, in its various mortifications, to its various consequences and results, to ulceration, mortification or necrosis, abnormal productions, &c. I have considered the subject more in an *anatomico*-pathological point of view, and before we can understand its surgical bearing, we must comprehend its pathological relations with other parts. To this point, we will call your attention at our next meeting.

LECTURE XXXII.

PERIOSTITIS—ITS VARIETIES—NODES, ETC.—RESULTS OF PERIOSTITIS—TREATMENT—OF OSTEITIS, PERIOSTITIS, NECROSIS, ETC.

I incidentally mentioned yesterday, that when inflammatory action seized either upon the bone or its investing membrane, it was very seldom confined to the tissue in which it originated. In the general tenor of my remarks, however, I confined myself almost exclusively to the pathological changes of the bone proper, and, before I go on to speak of the treatment of the disease, I deem it expedient to make a few remarks on inflammation of the *periosteum*, or *periostitis*.

We divide periostitis into several varieties. When arising from causes common also to inflammation elsewhere, as from a blow, a burn, &c., we have *simple* periostitis. *It* is liable to be produced by any cause from which inflammation in any other tissue may arise. But when we examine the subject in all its connections, we find—and it is a somewhat peculiar fact—that of all the tissues of the body, the periosteum is most liable to take on that species of inflammatory action which is the result of certain special causes, traceable to some peculiar diathesis or disease. It becomes highly important, then, that the surgeon should understand the nature of these causes, and the probable results to which they lead. Hence, too, we may have several other varieties of periostitis. One of the most prominent is the *rheumatic* periostitis, for rheumatism is often at the bottom of periosteal inflammation; which fact, if it be not understood, will very much embarrass the practitioner in carrying out any plan of treatment. You will frequently find that periostitis will be a concomitant of the rheumatic attack. But this is not all. If you examine a number of cases of the *gouty* diathesis, you will find that gout, like rheumatism, is very apt to give rise to periostitis, as also to inflammation of the other fibrous textures. And again, in considering these *diathesis*, relatively to the development of periostitis and inflammation of the bone proper, we find one of very wide spread influence in the *scrofulous* habit. Cases of scrofulous deposit in bone, (such as have been already spoken of, in discussing the diseases of the joints) are very apt to be accompanied by inflammation of the periosteum.

But, passing from that arising from peculiar diathesis, let us next turn our attention to the inflammation resulting from particular causes, as the introduction into the system, for example, of the venereal poison. Universal experience proves, that if the venereal virus is not eradicated, and its action on the system checked, after a certain time the morbid train of action produced by this poison, has a notable tendency to seize upon the periosteum, and also the bone itself. Thickening of the membrane will be the first evidence of its becoming affected, and these conditions are termed "syphilitic nodes." This species of inflammation exercises so wide spread an influence, that we find that no part of the fibrous system is capable of escaping. In process of time, if the train of action is not checked, it may completely riddle the bone, and entirely destroy the periosteum. Other similar causes might be stated.

But not to dwell here, let us go on to consider the pathalogico anatomical results of inflammation of these parts. In the first place we have determination of blood to the part, followed, as in the soft parts, by an exudation of precisely the same character. Coincident with these processes, if we examine the periosteum itself, we find that great changes are taking place in it. In a case of highly acute periostitis, this membrane becomes so soft, as to be easily torn and broken. As the disease progresses, this exuded material, lying partly within the texture of the membrane itself, partly on its surface and partly in the line of union between it and the bone, is converted into an organized substance, and once it becomes such, it may go on through a variety of changes. It may become converted into a kind of cartilage, similar to adventitious cartilage in other parts of the body; or it may become the nidus for a deposit of phosphate of lime, and an osseous structure may thus be superadded to the bone. A specimen illustrating this result, I here present. Under the peculiar power which modifies morbid growths, the exuded plasma has assumed the form of an osseus deposit on the surface of the bone. All the specimens which I here present, have been the result of periostitis.

Again: precisely as happens in other structures, the inflammation may assume another form. Purulent matter may be produced, and it may collect together, presenting precisely the same appearance as abscesses in other parts. Sometimes it may accumulate on the surface of the membrane, and sometimes between it and the bone, giving rise to an abscess in *that* situation.

Under a different modification of action this periostitis may, again, result in death of the periosteum—may cause *ulceration* of it—or it may give rise to the death of the periosteum and bone together. These parts are also liable to the various *heteroclyte*, and, in short, to all those malignant deposits which affect other structures of the body.

When you bear in mind the great variety in the local changes incident to these affections, you will not be surprised to learn that the external indications of periostitis are very various in their character. I shall not dwell upon them, as it would be an unnecessary waste of time. When the inflammation is first coming on, the changes are slow and the symptoms very obscure; but when it has arrived at a certain point, the patient begins to suffer a dull, constant pain, of a character resembling that of rheumatism, and this may go on for some time without the constitution becoming affected. Soon, however, a *symptomatic fever* will arise, and the patient's sufferings will go on from day to day, with little if any intermission, inflicting perpetual torment, until either he is relieved spontaneously or by art, or the disease goes on to the exhaustion of mind and body, and the powers of life can resist it no longer.

And so in the *chronic* form of the disease, these symptoms go on slowly until the patient is borne down by fatigue and distress.

In cases of acute periostitis and osteitis, we judge of the nature of the affection by a process of reasoning by exclusion. For example, if the tibia is attacked, and the skin is bound immovably to the bone, we can say, *by exclusion*, that inflammation of the periosteum and bone is present. When we have a constant aching pain, and hectic symptoms, we have reason to say that pus has formed in the medullary canal; and when this is the case, the disease will progress until an opening having been formed, we find either an abscess merely, or an abscess associated with necrosis. Again: when ulceration has taken place, as there are dead parts within, and it is necessary for these dead parts to escape, we make a puncture, and find caries or ulceration of the bone. Thus you see that the subject is an extensive one, and it is impossible, in the short time to which I am limited, for me to give minutely all of the symptoms peculiar to each condition.

We now pass, by a natural transition, to the *treatment* of these affections *en masse*. And first, as to simple periostitis resulting from common causes. I may dismiss this part of my subject by saying, that this, as inflammation elsewhere, is to be treated by carrying out the antiphlogistic plan, with a due regard to the intensity and extent of the inflammatory action. But, as I mentioned before, there is in very many cases a particular diathesis, or diseased condition of the system at large, which has produced, and may keep up, the local disease. In such cases, I need not say it becomes necessary to modify our plan of treatment, in accordance with that condition of the constitution. The peculiar diathesis must always be borne in mind, and your treatment is mainly to be directed towards *its* cure, or its alleviation if it is incurable. The peculiar treatment of each diathesis would be too extensive a subject to occupy our attention at this time; but I would, in general terms, exemplify my remarks by supposing a case of the inflammation arising from rheumatism. Your patient spends sleepless nights from the violence of the pain; his constitution is vigorous; and you have seen him at the earlier stage of the attack. In addition to the other depletive measures, I would recommend under these circumstances, in the first place, that you should tie up his arm and bleed him; and, if necessary, repeat the venesection again and again. If, however, he is weak, his constitution bad, or some other circumstance obtains, by which you deem it best to avoid general blood-letting, you should apply cups, or leeches, or both, and encourage their bleeding with warm fomentations. But, under these circumstances, the constitutional treatment is by far the most important. Here there is one circumstance to be borne in mind. Though there is a considerable resemblance between rheumatism and gout, there is still this essential difference: that, when the rheumatic diathesis exists, it is essentially a blood disease. This being the case, it is important, that in all our applications of remedies, this blood disease should be remembered. Let us see, then, what should be done. On examining the urine, we find such a deposit as shows the blood to be in a deranged condition; and, starting from this point, let us see if we have any agents capable of eliminating these poisonous elements from the constitution; which give a peculiarity to the disease, and change the character of the fluids. Have we any agents by which we can restore the blood to its natural state? Fortunately for humanity, we have many such. At their head, I would place the *iodide of potassium.* It must be given freely. Five grains may be administered, three times a day; and if it is borne well, the dose may gradually be increased, always, however, being careful to watch its effect. The modus operandi of this agent, it is difficult to explain; but be this as it may, you will find that in acute or chronic periostitis, or ostitis, from rheumatism, as soon as the patient feels its effects, a very great amelioration in the symptoms will follow. Another agent is the *nitrate of potash,* or common saltpetre; which, if given in large doses, will be found, like the iodide of potassium, very efficacious in the rheumatic diathesis. To be at all useful, it must be employed in large doses. At least half an ounce should be taken in the course of the day, bearing in mind, however, that it is liable to affect the stomach in such doses. Again, we have the different preparations of *colchicum.* These may be given alone, or in combination; and should be adhered to for a long time, but with great caution, as they are powerful agents. Allied to colchicum, is aconite, a virulent poison; which, though useful, must be employed with exceeding caution. It may be used internally, or externally. When applied externally, it is followed by a sensation of pricking, and often, after a time, by diminution of the pain. Another powerful agent is mercury, under different forms. It is very appropriate, but must be used cautiously and slowly, giving it in small doses. *Calomel* and *blue pill,* but more especially the *iodide* and the *bichloride of mercury,* or corrosive sublimate, and the other preparations, in small doses, will, any of them, be found useful. Again, we have in the various *narcotics,* another class of remedies applicable to, and, in fact, never to be omitted in these cases. At the very head of this class, I would place opium and its preparations. It is especially important to diminish that susceptibility of the constitution, which, if the disease be not checked, will expose the patient to constant torture. *Belladonna, hyosciamus,* and various other narcotics, are also useful in producing this immunity from suffering. You may, also, in these cases, adopt some one of the various diet drinks; and some of the many compounds of sarsaparilla are also applicable here, if you have any confidence in them. I have none. They are fit only to fill the pockets of the apothecaries, and to delude your patient.

In *caries* of a bone, after we have opened the abscess, our main attention should be directed towards supporting the constitution of the patient. A generous diet should be allowed him, and even wine or brandy may be added to his bill of fare. Tonics, also, should be employed. Bark, the various vegetable bitters, iron, &c., may all find a place in your treatment during some stage of the disease. Some of the older writers have regarded assafœtida as a specific in these cases. I have no confidence in it, and cannot see how it can act beneficially, except by its stimulant property. Nor have I any more confidence in the remedial powers of the phosphate of lime, in such cases. Nature is perfectly competent to extract this substance from the materials in combination with which it is presented to her; and if it is stuffed in by medication, she is unable to use it.

But in *necrosis*, the surgeon has other duties to perform. After opening the abscess, it becomes a question how the sequestrum is to be removed; which, as you may remember, may be exceedingly various in extent. Now, where it is only on the surface of the bone, and there is no involucrum, all that it is requisite for us to do is, to remove the dead portion with a pair of forceps; but when it lies beneath an extensive involucrum, it becomes necessary to resort to other expedients. And here one circumstance presents itself, which is so admirably exemplified by this beautiful specimen in my hand, that I must call your attention to it. You will observe, on comparing this diseased femur with a sound one, that the axis of the limb to which the former belonged, must have been changed materially from its natural direction. You perceive that this has produced such a change in the relative situation of the sequestrum, that it is thrown out of the axis of the bone. Now, in consequence of this change in the axis of the sequestrum, and its oblique position, it often happens, that, on cutting down to the cloacæ, you may seize the dead portion of the bone with the forceps, and succeed in drawing it out; and, indeed, it sometimes happens, that, owing to this same change, nature herself is enabled to effect the relief. Unfortunately, however, this result cannot always be attained, the sequestrum being sometimes held so firmly as to render it necessary to resort to the performance of an operation to remove it. The parts should first be attentively examined, before we proceed to lay the sequestrum open to view. We may find it loose and movable. In such a case, we should pass a pair of forceps through the opening, and strive to extract it by pulling it in different directions. If we fail in this, we must resort to other means.

We may break it, by means of the bone shears, into fragments, and take it away piece-meal. But even this will not always succeed; and then it becomes necessary to make an incision down to the involucrum, as long as the diseased portion, dissect back the flaps, lay bare the involucrum, and open through it, either with a Hey's saw, a trephine, or a mallet and gouge, according to your convenience, and the position of the disease. Having cut through the involucrum, and removed the sequestrum, all you have to do, is to fill the cavity with lint, and let it heal by granulation from below.

But I have still a word to say in this connection. I have remarked that abscesses may be formed in the substance of the bone. In such a case, a cure cannot be effected until the matter has been drawn off. When, then, you discover the existence of a medullary abscess, you must cut down, as in necrosis; lay bare the bone, and open the wall of the abscess with a trephine, saw, or gouge. As this is generally accompanied by more or less of necrosis, which it may be impossible to extract by the opening you have made, I would advise, as a more expeditious plan, and not a more painful one, that you should take a common carpenter's gouge, and chip away the bone over the abscess. This is the practice I pursue in cases of necrosis, osteo-pyosis, &c. When you use the saw, you will save time by first making two or three perforations, and then sawing into them with a Hey's saw. But a great deal of time, and consequently of suffering, may be saved, by using, as I have stated, a *mallet and gouge.* You may perform the operation in one-tenth the time; and you also gain the advantage of having it in your power to remove easily any portions of the dead bone, which you may find at the bottom of the abscess.

ESSAY No. 5.*

GENERALITIES OF AMPUTATION—CASES WHICH REQUIRE AMPUTATION—PERIOD MOST FAVORABLE FOR AMPUTATING—MOST ELIGIBLE POINT FOR AMPUTATING—COMPARATIVE ADVANTAGES OF AMPUTATING THROUGH THE CONTINUITY AND IN THE CONTIGUITY OF THE BONES—APPARATUS AND INSTRUMENTS TO BE PROVIDED—MEANS OF COMMANDING THE HEMORRHAGE—DIFFERENT METHODS OF OPERATING—AFTER TREATMENT.

Amputation may justly be considered one of the most desperate resources of the surgeon. In most other cases, the numerous means furnished by his art enable him to restore the suffering organs to health; but in the conditions requiring amputation, there is either such an injury of the living structures, or such an aggression committed upon the vital powers, as to render it indispensable to sacrifice the diseased member. It therefore becomes a matter of the utmost consequence to distinguish, as far as practicable, those cases which call for this appalling and desperate resort.

In the present state of our knowledge, all that we can do, in considering the cases which require amputation, will be to lay down certain general principles, to which many exceptions must of course arise, in particular cases, and under peculiar circumstances.

With regard to the precise cases which call for the sacrifice of a member, there has ever existed considerable difference of opinion; some restricting the operation to so small a circle of cases as almost to exclude it from the resources of the surgeon, while others, swayed by false judgment, or actuated by an overweening desire to enjoy the eclat of operating, have often resorted to it unnecessarily.

The following may be considered as a fair expression of the indications which require amputation. When an individual is affected with a disease or injury of a member, which, in the present state of the science, is incurable, or which is rendered so, either by the fault of his constitution, or the circumstances in which he is placed, and which at the same time endangers his safety, or will, by its nature, render him a cripple for life, the removal of the part, by an operation, will be called for. Such are, in general terms, the exigencies which justify a resort to the operation of amputation.

---

*This Essay is entirely composed of extracts from Prof. Geddings' article on amputation, in the American Cyclopædia of Medicine and Surgery, which fact the reader is requested to bear in mind, especially when the personal pronouns are made use of. S. L.

We pass now to another point involved in the general consideration of our subject, viz: *the period most favorable for amputating.* There is no point in the discussion more important to determine, and few unfortunately have given origin to so much diversity of opinion. The importance of the question relates more especially to those cases in which the operation becomes necessary on account of external violence, and those in which it is demanded for the removal of a limb affected with gangrene, though it is not unimportant in cases of a chronic character. In the first set of cases it is called *primitive* amputation where the operation is performed on the spot, or within a short period after the receipt of the injury, and *consecutive*, where it is not practiced until after the expiration of several days, or subsequent to the subsidence of the disturbance which follows the accident. These are the points upon which the discussion has mainly turned—one party advocating immediate amputation, while the other has as strenuously insisted upon the propriety of delaying it until the tumult of the system, aroused by the injury, has entirely subsided.

If a candid appeal be made to the results of experience, especially to that of the army and navy surgeons, whose opportunities of observation are the most extensive, and if all the facts are taken into consideration, the question so long agitated may be considered as fairly settled in favor of primary amputation, and the practice recommended by Faure and LeConte, is proved not only to be erroneous, but fraught with dangerous consequences.

The principal arguments which have been urged by those who condemn immediate amputation, have reference to the condition of the patient, and the chance that limbs may be sacrificed, which, by delaying the operation, might be preserved.

It is well known to all surgeons who are conversant with the phenomena of gun-shot and other violent wounds, that these accidents frequently inflict an alarming shock upon the individual, and sometimes occasion a temporary prostration or a suspension of the vital powers. This state of the system has been very justly urged by the advocates of consecutive amputation against the propriety of performing the operation immediately. But what sensible surgeon would ever think of removing a limb in such a state of the system? There is always a period intervening between the receipt of the injury and the development of the inflammatory symptoms, at which the operation should be performed. Until the patient is aroused from the stupor occasioned by the shock, the operation will be hazardous, and it should always be a rule to delay, until the powers of animation are resuscitated, whether that event take place in one or twenty-four hours.

When, however, circumstances render it impracticable to resort to primary amputation, and the inflammatory symptoms have already made their appearance, all our hopes of success must rest upon our ability to conduct the patient safely through the stage of excitement, fever, and suppuration, and bring him to the period recommended by Faure as the most favorable for the operation. Amputation must not be thought of while the whole system is in this tumultuous condition, except it should be demanded by the rapid progress of gangrene, in which case the removal of the limb ought not to be delayed. Here it would be dangerous to wait for the development of a well-defined limit between the dead and the living parts: death will ensue before such an occurrence can take place; and the concurrent experience of most modern surgeons of extensive observation, has confirmed the correctness of the practice so ably inculcated by Larrey, of immediate amputation in cases of spreading traumatic gangrene.

Should this necessity for amputation during the persistence of the inflammation not exist, the surgeon must content himself with such treatment as will be calculated to bring about a calm in the conflicting acts of the living organism; and when that is induced, which will generally be within a period varying from fifteen to twenty-five or thirty-days, the member may be removed with much greater probability of success than at any other moment, except that which has been designated as the most advantageous for primary amputation. Here, however, much must depend upon the constitution of the individual, the condition of the limb, and the state of the internal organs. The patient is too frequently exhausted by profuse suppuration and hectic, or becomes affected with a formidable lesion of some of the important viscera. But if the removal of the limb has been necessary from the commencement, and there is now no possibility of preserving it, amputation must be regarded as the "*unicum remedium,*" and should be practiced, although the chances of success be unpromising. There are, nevertheless, some circumstances which will render the operation altogether hopeless. These consist, for the most part, in the existence of a dangerous or incurable disease in some part or organ essential to life; and extreme debility may also constitute a counter-indication to the operation. Yet experience has demonstrated, that in many cases where the debility is considerable, the removal of the violent and exhausting irritation kept up by the diseased limb, is soon followed by a speedy restoration to health.

Concerning the *most eligible point* for the performance of amputation, there is far less difference of opinion at the present day, than in former times. Many of the ancients recommended the incision to be always made through the mortified parts, and though Celsus prescribed a different procedure, their advice was generally followed, until its impropriety was exposed by Wiseman. Since his time, it has been the established practice to cut through the living parts, either at, or a little above the line of demarcation by which they are separated from the dead.

As regards the precise part of the member upon which the operation should be performed, it must be determined by the necessities of the case. The operation may be performed either through the substance of the bone, or through the articulation—through the *continuity*, or through the *contiguity* of the bones. In fixing upon the point at which it should be executed, we have what is called the point of *election*, and that of *necessity;* but in many cases the first is entirely wanting, in consequence of the disease being so situated as to leave us no alternative but to amputate at a particular place.

It may be laid down as a general rule, that the member should be removed at that point which will ensure the effectual extirpation of the disease, and the preservation of the greatest possible quantity of the limb. In cases of gangrene, when the destructive process is still progressive, the incision should be made sufficiently remote from the seat of disease to insure its passage through parts which are healthy; and this precaution should also be observed where the member is affected with any specific form of disease which would be liable to recur, as well as when the affection of the bone extends higher up than that of the soft parts. It has been recommended not to amputate in the vicinity of a large joint, and as a general rule, this precept should be observed. There are, nevertheless, cases in which it ought to be departed from. Should a disease or injury of the leg or arm, be situated so high up as to leave no alternative but to amputate, in the vicinity of the knee or elbow, or above these articulations, the former procedure must be adopted, inasmuch as those joints are so useful to the individual, that they ought not to be sacrificed, except from absolute necessity.

It is also desirable to perform the operation upon that portion of the limb which is capable of affording the best flap or covering for the stump. To secure these advantages, however, too much must not be sacrificed. Amputations generally do well in the tendinous parts of the leg and arm, and as it is important to save as much of the member as possible, when the disease or the injury is situated low enough down to admit of the operation being performed at these points, this object can never constitute a sufficient reason for unnecessarily sacrificing a member which may be useful to the individual.

There is one point of practice to which I am anxious to advert. It has been the practice with many surgeons, when the humerus or femur has been shattered in the immediate vicinity of their articulations, either by musket or cannon shot, and when the soft parts have been extensively contused or lacerated; or when necrosis of these bones occupies the same situation, to resort to amputation at the shoulder or hip joint. This conduct is exceedingly improper. The operation may, in a majority of such cases, be successfully performed through the continuity of the bone, and the individual will thus be saved the pain and hazard of an amputation through the articulation.

Since the time of Brasdor and Larrey, who revived in modern times the method of amputating, in certain cases, in the ***contiguity of the bones***, repeated experience has shown that many of the fears which were formerly entertained relative to cutting into an articulation, were for the most part groundless, and if it is not safe to amputate through the large hinge joints, this operation can be more advantageously performed through some of smaller magnitude, than at any other point.

It will be generally observed, that the hazard attending amputation at the articulations will be always in ratio with their extent, and the complicated character of their arrangement. The hip and shoulder joints, those of the phalanges of the fingers and toes, of the meta-tarsus and meta-carpus, wrist, &c., present a less extent of surface, and are more simple in their arrangement, than those of the knee and elbow. Hence it has been found by repeated observation, that amputation may be safely performed at those joints, whereas, at the elbow and knee, especially at the latter, though sometimes successful, it is by far a more hazardous operation.

There is, besides, another fact to be taken into account in determining upon the comparative advantages of the two methods. The cartilages take on less readily the adhesive form of inflammation than the bones themselves, and when a large extent of such a surface is exposed, it sometimes happens, that, although the flaps unite as under ordinary circumstances, a cavity remains in relation with the central part of the stump, in which tedious suppurations take place, and retard the cure.

Influenced by these and other principles, surgeons of the present day seldom amputate at any but the smaller and more simple articulations, and more rarely at the ankle, knee, or elbow.

The *apparatus and instruments necessary in amputation* vary according to the kind of operation adopted, and the point at which it is to performed. It will be proper, however, to enumerate all that will be requisite in the execution of the operation upon any part of the body.

There should be two good tourniquets, or, in cases of emergency, where this instrument is not at hand, a strong bandage, or a handkerchief, may be tied around the member, and rendered sufficiently tight by inserting beneath it the end of a stick, the hilt of a sword, or any convenient thing which may be at hand, with two or three turns of which the band may be twisted until it is rendered tight enough to command the circulation. For the same purpose there should be provided a key or boot-hook, with the end wrapped with lint or old linen, for the purpose of compressing the artery. Knives of different configurations and dimensions are employed, according to the kind of operation that is to be performed. They should always be of a length proportionate to the volume of the member. Those for the hip joint should be about twelve inches long, and three fourths of an inch broad near the handle. For the shoulder, the instrument need not be more than eight inches in length. A catlin of smaller dimensions will be more convenient for the amputation of the arm, fore-arm, elbow, wrist, carpus, tarsus, &c., the size being always regulated by the dimensions of the part.

There should also be one or more large convex scalpels, sharp pointed bistouries, a retractor of soft leather or strong cloth, with two or three tails, according to circumstances; a good amputating saw with an extra blade, a meta-carpal saw, bone forceps, one or two tenaculums, a pair of artery forceps with a slide or spring, and several curved needles armed with ligatures. In dressing the stump it will be necessary to have a sufficient supply of silk or animal ligatures, of different sizes, and properly waxed; adhesive plaster spread and cut into strips; lint made into pledgets and spread with cerate; compresses; a roller bandage of coarse muslin three inches wide, and three or four yards in length; sponges, and warm and cold water; bottles filled with hot water, or a chafing dish with burning charcoal to warm the adhesive plasters; towels, &c., &c.

I employ a saw about three inches longer than that in common use, the handle of which is so attached as to form an obtuse angle within the blade. In consequence of this arrangement much more force is thrown upon the teeth of the instrument at each propulsive effort, than when the handle is placed on the same line with the blade, and it cuts through the bone in nearly one half the time. The teeth should always be widely set, so as to form a furrow of sufficient dimensions to prevent the pinching of the instrument, which is always embarrassing, and sometimes causes the bone to be splintered before it is divided.

The best retractors are made of kid skin, or chamois leather, but when these are not at hand, coarse muslin will answer very well. For the thigh, a piece eight inches wide, and fourteen inches long, should be divided lengthwise, from one end to the middle, and the end of the slit should be rounded out so as to adapt it to the contour of the bone. For the leg or fore-arm, the retractor must be divided into three tails, one of which must be passed through the interosseous space.

All these implements should be arranged upon a table or tray, in the order in which they will be required, and covered with a towel until the operation is commenced.

The patient is generally placed on a table covered with a mattrass or several folded blankets, and with his head and shoulders elevated. When, however, the operation is to be performed at the shoulder joint, upon any part of the arm, the hand or foot, the sitting posture will either be necessary or may be adopted from choice.

In the larger amputations, several assistants will be requisite. Each one has his particular duties to perform, and they should all be so disposed as not to embarrass each other or be in the way of the operator.

The means of commanding the hemorrhage during the operation, demand the attention of a reliable assistant, whether the tourniquet or simple compression be employed. Although the tourniquet of Petit, improved and variously modified, is generally used by modern surgeons, and is, under all the circumstances where it is applicable, the safest means of commanding the hemorrhage, it cannot be applied in amputation at the hip and shoulder joints, or in the immediate vicinity of these articulations, and is liable to serious objections even under the circumstances to which it is applicable; as the pain it occasions; the impediment to the verous circulation which it produces, and which causes the blood to accumulate, and as soon as the first incision is made, a profuse gush of that fluid takes place—a circumstance often of great importance in debilitated subjects—and the unequal contraction of the muscles which takes place when the instrument is removed, and renders the face of the stump irregular and uneven. These considerations have induced many distinguished surgeons to abandon the tourniquet, and rely upon the simple compression of the artery, either with the thumb or fingers of an assistant, or the extremity of a common key or boot-hook, wrapped with old linen or soft cloth. The tourniquet, however, is safer, and for that reason should be adopted where a *reliable* assistant is not at hand.

When operating, it becomes an object to secure a sufficient flap of soft parts to cover the bone when the stump is dressed; and hence in speaking of amputations we divide them, in the first place, into those by the *double* and those by the *single circular incisions.*

When we operate by the *double circular* incision, we cut first through the skin and sub-cutaneous cellular tissue by a circular incision; dissect back and turn over the soft parts, as we would the cuff of a sleeve; and then make the second incision to the bone. When we operate by a *single circular incision,* the difference is that the knife is carried by one incision as near as possible to the bone.

Again, we have the *double* and the *single flap* operations. In forming these flaps we may either transfix the limb and cut outwards or cut from the surface to the bone. A limb may be amputated with facility by either of these methods. There is still a very great difference of opinion among surgeons as to their relative advantages. It is but a matter of taste, however. So far as the safety of the patient is concerned there is no difference whatever. Each surgeon must select that plan which is to him the least difficult, and which he can quickest perform. For my own part, I prefer the flap operation, as occupying less time, and being less painful and more easily performed.

In amputating by the *circular method,* a great many different plans of conducting the various steps of the operation are pursued. But after all, these diversified modifications are of much less importance than might be inferred from the numerous disquisitions to which they have given origin. The following will perhaps be found the most convenient and expeditious method of securing all the objects proposed.

The patient being conveniently placed and every thing properly disposed, the operator, by a single circular sweep, carried steadily round the limb, divides the integuments fairly down to the muscles. The assistant still drawing these upwards, he next with a few strokes with the point of his knife, or a common scalpel, divides the connecting bands of cellular tissue, until a sufficiency is saved to cover the face of the stump. The extent of this dissection should of course be regulated by the diameter of the limb. In the thigh three or four inches will be required, but in the leg, arm, &c., a smaller quantity will suffice. The integuments need not be reversed, as is advised by some, for no advantage can accrue from thus contusing and injuring the soft parts. Inserting his knife a second time, on a line with the margin of the retracted parts, and with the edge directed obliquely upwards, the assistant still grasping the member with both hands, and retracting the structures, he makes a second circular cut through the muscles down to the bone, or at least so deep as to allow the more superficial to be drawn upwards. A third cut is next made in the same manner, inserting the edge of the knife, held upon the base of the small cone formed by those muscles which are deepest seated, which is to be carried fairly down to the bone all around its circumference. Where the member contains two bones, the point of the knife should be made to glide in the interspace, while it is describing the circular evolution, as advised by Lisfranc; or if the operator is not expert, the structures which are situated between the bones may be divided with a common catlin, after the completion of the circular incision. The periosteum is next to be divided, in order that it may not become entangled in the teeth of the saw, and the retractor is to be applied. The operator then fixes the thumb-nail of his left hand upon the bone at the point at which it is to be divided, to guide the saw, the heel of which he fixes upon the bone, and then making a slight pressure on the instrument, he draws it slowly and steadily towards him from heel to point, so as to form a superficial groove, the depth of which is increased by two or three light and steady alternate sweeps backwards and forwards. Having thus established a channel of sufficient depth to prevent the saw from slipping, he may conduct his strokes with greater rapidity and force, always making them long and free, and taking care, when the bone is nearly divided, to saw slower, so that it may not be splintered. The assistant, who supports the limb, should also be particular, during this step of the operation, not to allow any flexure which can pinch the saw, or fracture the bone. When there are two bones, the saw should be first made to play upon one of them until it forms for itself a groove, after which, by depressing or elevating the handle, it should be brought to bear upon both. The smaller of the two, however, must be cut through first. Should any spiculæ remain after the section of the bone, they must be removed by the bone-nippers or a scalpel.

But the *flap* operation, as already stated, is the one which we prefer. The operation may be performed with either a single or with two or more flaps. The cases to which the first method is applicable will be designated in connection with the particular operations. The latter plan is more extensively applicable, and is more generally preferred. It has been differently executed, according to the object proposed, or the predilection of the surgeon. All flap operations, however, are performed either by cutting from without inwards, or by plunging the knife through the thick part of the member, and bringing it out so as to form a flap of the proper dimensions. The first of these methods, though somewhat more tedious than the second, is preferred by many operators, because of the greater facility afforded by it in regulating the form and dimensions of the flap. The other procedure, however, is infinitely more prompt, and consequently less painful.

The operation of cutting from without inwards may be performed so as either to make the flaps of the integuments alone, or of them and the muscles together. It is more frequently practiced, however, without dissecting the integuments from the muscles, they being merely divided by the first incision and retracted; which done, a second incision is made upon a line with their margin, through the muscles, and down to the bone. This procedure should always be preferred when the parts are incised from without inwards, inasmuch as a better tegumentary covering will be thus preserved, than when the skin, cellular tissue, and muscles, are all divided by a single sweep of the knife. The method of forming the flaps by extending an incision obliquely from the surface to the bone, is preferred by some. Chelius forms the first flap in this way, and then transfixing the member on the other side of the bone, by introducing the knife at the angle of the first incision, he forms the second flap by cutting from within outwards; and Ravaton, LeDran, and B. Bell, divide the integuments and muscles by a circular incision, and then make a longitudinal cut upon the external and internal part of the member, the inferior extremities of which fall upon the circular incision. Nearly all others, who prefer the flap amputation, execute the operation by thrusting a long narrow catlin through the member, first on one, and then on the other side of the bone, and cutting from thence towards the circumference. After the flaps are formed and held back, the muscles which adhere to the bone are divided by a circular incision.

As a general rule, the length of each flap, where two are formed, should be a little more than one half the diameter of the member, and it is advised by most surgeons to make both as near as possible of the same shape and dimensions.

We are inclined, both from reason and experience, to prefer the flap operation in a large majority of cases, and we are pleased to observe that the members of the profession are every day becoming more sensible of its advantages. There are cases, however, in which the circular operation should be preferred, and as both methods will succeed very well, it should be left to the operator to select that which is best adapted to each individual case.

Amputation by the oblique or oval method has been applied by Guthrie to the amputation at the shoulder joint, and by others to the removal of the bones of the carpus and tarsus, to which it is well adapted. The chief peculiarity of the method is, that the incision is made from without inwards, and is carried obliquely around the member so as to represent the letter V inverted, the acute angle being directed upwards, and the obtuse portion downwards. It is sometimes performed by two cuts, one dividing the integuments completely round, and the other extending to the bone. Some operators, however, accomplish the division of the whole of the soft parts by the first cut. The former method should be preferred at the shoulder, or wherever the member is a large one.

Whichever method be adopted, the upper part of the incision should extend a little above the point at which the bone is to be sawed, and ought, as a general rule, to occupy the part of the member upon which the soft parts present the least thickness.

After Treatment.—The first object that claims the attention of the surgeon, after the removal of the member, is the *hemorrhage. The ligature* is the most appropriate, and, indeed, the only means that can be securely relied on, for commanding the hemorrhage from large arteries. A single thread of fine silk should be used for the smaller arteries, but for the principal trunks, a ligature composed of two or more threads must be employed. One end should always be cut close to the knot, and when several ligatures are applied, the remaining ends should be brought out at the nearest angle of the wound; or if one or more of them be placed in the centre of the stump, they may be brought out at the nearest point between the adhesive strips.

To draw out the extremity of the bleeding vessel some surgeons prefer the tenaculum of Bromfield, while others employ the artery forceps. We have generally found the former the most convenient instrument. The point ought to be very sharp, and well polished. The end of the vessel should be cautiously transfixed, without including any of the adjacent structures, and then slightly drawn out, so as to permit the assistant to fix the loop of the ligature upon it. When this is accomplished, the two ends are to be cautiously drawn, while with the point of the index finger, the slip of the loop is pressed down upon the vessel. It should always be secured by a double knot, and particular care be taken not to include the vein or the accompanying nerves. The principal artery being secured, those of smaller size are to be sought by gently sponging away the blood and slacking the tourniquet or diminishing the compression. Every vessel that bleeds must be secured, for although it is a bad practice to apply too many ligatures, it is still more so, to be obliged, after the stump has been dressed, to open it on account of secondary hemorrhage, or to expose the patient to the irritation and suppuration likely to arise from an accumulation and confinement of grumous blood.

Sometimes considerable venous hemorrhage takes place, which is difficult to control. The tying of the vein with the artery has been adopted, but sometimes this produces an alarming phlebitis, and the plan should never be resorted to, except from urgent necessity. Very alarming effects have also resulted from including the nerve in the ligature, and in some cases it has given rise to tetanus.

When, as is sometimes the case, considerable hemorrhage takes place from the nutritious artery of the bone, it should be arrested by the introduction of a small plug of wax or soft wood; by a lint compress, or, what will generally be effectual, by twisting or lacerating the mouth of the vessel with the point of the forceps. When merely a slight oozing continues after the arteries have been tied, the stump should be soaked with cold water. Astringents ought never to be employed under such circumstances. They irritate the wound, excite inflammation, and create an obstacle to immediate union. If a small vessel bleed, it should be secured, and time must be allowed for re-action: for it frequently happens that then many vessels bleed for the first time, and render it necessary to open the stump. To obviate this, some surgeons, as Parrish, Klein, Dupuytren, Lisfranc, and others, have proposed to leave the stump open for some time after the operation: a practice which we have seen adopted with advantage, not only as a precautionary means against hemorrhage, but likewise, as we are inclined to think, in facilitating union by the first intention.

Other means of arresting hemorrhage have been proposed. One of these is torsion of the extremity of the vessel. This practice, since 1828, has been practiced to a considerable extent, and although it has been found successful, the result has proved that it possesses no advantages over the ligature, and that it is much less safe. It ought never to be confided in where the vessel is large, and should, if employed at all, be confined to vessels of small calibre.

To accomplish the torsion, the divided end of the vessel is to be seized and drawn out with a pair of forceps, furnished with a slide or spring, taking care to have it separated from the other structures. A second pair of forceps is then to be fixed on the vessel in the bottom of the wound, so as to grasp it in a transverse direction, with which it is to be supported, while seven or eight turns are made upon its extremity with the first instrument; or the artery may be held between the nails of the index finger and thumb, while torsion is made with the thumb. The latter method, recommended by Velpeau, is the simplest, and is equally effectual.

Contusing or lacerating the cut end of the small vessels with the tenaculum or forceps, will often be found sufficient to stop them from discharging blood. But this procedure should never be relied on, except for such branches as are too small to require the ligature, and which merely give rise to a slight oozing.

When the artery is so profoundly imbedded in the soft parts as to render it impossible to isolate it and draw it out sufficiently to apply the ligature, a common curved needle armed with three or four threads of silk should be introduced into the soft parts first on one, and then on the other side of the vessel, and the ligature drawn so as to include a portion of them, together with the artery. Should the artery be so ossified as to be incapable of sustaining the ligature applied in the usual manner, a cone of soft buckskin large enough to fill its cavity may be passed into its orifice, and there secured by a soft flat ligature of the same substance, tied around the vessel in the usual manner.

The plan proposed by Velpeau, of reverting the extremity of the artery, and thrusting it into the soft parts, is unsafe, and as it secures no advantage, ought never to be employed, except for very small vessels.

After all the vessels have been secured, and the oozing has ceased, the next thing to be done is to *dress the stump.* All coagula of blood should be carefully sponged away, and the parts wiped dry with a soft towel; and the surgeon should then assort the ligatures, and place them in the situation he wishes them to occupy, arranging those which are nearest the circumference so that they may be placed in the angles of the wound, and bringing out the others in the centre.

If the surgeon desires to obtain *union by the first intention*, it is important that the corresponding surfaces of the flaps should now be brought in accurate contact, and that no foreign substance be interposed. If the silk ligatures be used, one end should be cut close to the knot, and if chamois leather or buckskin, nothing but the knot itself should be left. Coagula of blood must also be carefully removed; for if suffered to remain, they always excite much irritation, and not unfrequently give rise to suppuration. The edges of the skin, being neatly approximated in a line corresponding to the direction of the flaps, when the operation is performed in that manner, are to be confined with strips of adhesive plaster, which are to be brought over the end of the stump, and placed so as to leave sufficient space between each for the escape of the discharges. It was formerly the practice to use sutures for this purpose; and although they have been abandoned by most modern surgeons, there are still some who continue to employ them. They are never necessary, and they may do considerable mischief. After the adhesive strips have been applied, a piece of lint spread with simple cerate should be laid over the face of the stump. To furnish additional support, a roller bandage must next be applied, by laying one end longitudinally upon the limb, and carrying the bandage, by reversing it in opposite directions over the face of the stump, so as to form a cross, and ascending with it by spiral turns some distance up the member. By some it is recommended to make the first turns upon the trunk, and thence carry the bandage downwards to the base of the stump, with the view of bringing the muscles more completely over the face of the bone. The wound must be kept cool, and should be as little encumbered as possible, and the more simple the dressings, provided they serve to keep the edges of the wound together, the better.

The stump being dressed, the patient must be put to bed, and the member placed upon a pillow in such a manner that the parts remote from the wound shall bear the greater part of the pressure. A mattrass should be preferred to a feather bed, and when it is desirous to keep the stump wet, the pillow may be covered with soft oiled silk.

When *union by the second intention* is desired, the best method will be that practiced by Dr. Physic, and recommended by Dorsey, of merely interposing a pledget of lint between the edges of the wound, so as to prevent the skin from adhering, and then confining the parts in the manner directed above.

Few questions relating to surgical practice have given rise to more discussion than that of the comparative advantage of immediate and consecutive union after amputation. From a faithful survey of the whole grounds, we would lay it down as a rule, that immediate union should be attempted in all cases where the structures are healthy. We are not sensible of any bad effects that can possibly result from it. We may sometimes fail in accomplishing it; but even then we lose nothing by the attempt; for we shall have as many facilities for accomplishing union by the second intention, as we would if we had sought it from the first. Even when the parts are not entirely healthy, they ought to be placed as nearly as possible in apposition, taking care not to constrict them with the strips and bandages; and if we should merely succeed in obtaining union to a limited extent, the advantage will be considerable, as the part to be healed by granulation will be thereby diminished.

The second dressing should, under ordinary circumstances, be deferred to the fifth or sixth day. But in some instances, where considerable oozing of blood takes place, it becomes confined within the bottom of the wound, and renders it necessary to remove the first dressing at an earlier period.

As the first dressings are generally very firmly agglutinated with each other, great care must be taken in their removal, not to tear up any adhesions of the edges of the wound, and to avoid inflicting unnecessary pain. To facilitate their detachment, they should be carefully softened by throwing a gentle stream of tepid water upon them, until they will separate easily; and while the surgeon removes them, an assistant should carefully support the stump, making a gentle pressure against its sides, to prevent the edges from separating.

If the stump is large, it will be advisable to remove only one adhesive strip at a time, supplying its place with a new one, before the next is detached, thus obviating the necessity of suddenly depriving the stump of all its support. After the stump has been cleansed with a soft sponge, and wiped dry with soft linen, the adhesive strips must be applied as before. Over them should be laid a pledget of lint spread with cerate, or spermacity ointment, and the whole confined by a roller, as in the first dressing. The subsequent dressings must be managed upon the same principles, and should be renewed as often as the circumstances of the case may require. The ligatures of the small arteries generally become loose about the fifth or sixth day, and those of the principal trunks about the tenth or twelfth. Sometimes, however, they are retained for several weeks, and keep up more or less suppuration in the vicinity. After sufficient time has elapsed for them to become detached, very gentle traction should be made at each dressing, taking care never to use sufficient violence to tear them away. Should they not become loose in the course of two or three weeks, they may be cut away by means of a small beaked knife, having a slight notch or groove upon the beak to direct it along the course of the thread.

There are some *accidents consecutive to* amputation, which may require special treatment. *Hemorrhage*, at various periods and from various causes, may occur. Sometimes it occurs soon after the dressings are applied, either because too little time has been allowed for reaction, or from the slipping of a ligature or a division of the tunics of the vessel by the same, in consequence of their diseased condition; and it sometimes also happens that a kind of vital erethism is excited in the stump, which disposes the capillaries to bleed to a considerable extent. The veins may also pour out blood, in consequence of the bandages being applied so tightly upon the limb as to interrupt the free return of the blood.

From whichever of these causes the hemorrhage proceeds, we should never open the stump, except where the necessity is absolute. That operation is always productive of extreme pain, and is regarded by the patient with horror. In most cases where the bleeding is not profuse, it will merely be necessary to remove the roller and compresses, to slightly elevate the stump and expose it freely to the cool air, or to keep it wet with cold water, or covered with ice. If the hemorrhage is venous, the simple removal of the bandage will generally be sufficient. Should these means not prove efficient, pressure must be made upon the course of the principal artery, and when the hemorrhage is more profuse and cannot be commanded by any of these means, the stump must be opened. If the accident occur shortly after the operation, it will be easy to secure the bleeding vessel. But if this cannot be done it may sometimes be commanded by means of a piece of soft sponge or agaric, confined for some time upon the extremity of the artery.

Hemorrhage sometimes takes place from the stump at a much later period, and proceeds from a very different cause. From a want of a proper degree of plastic power in its tunics, the vessels take on ulceration at the point at which they are included in the ligature, or they become affected by a kind of sloughing process, by which the ligature is thrown off before obliteration can be accomplished. Consecutive hemorrhage from these causes seldom occurs before the tenth or twelfth day, and frequently after the third week. It is always a formidable accident, and difficult of management. The ligature to the orifice of the bleeding vessel is no longer practicable, except by including a portion of the soft parts. A piece of sponge or agaric may sometimes be advantageously bound upon the part, by means of a compress and roller, properly adjusted upon the limb; and it will also be proper to apply compression upon the course of the artery. Should all these means fail, the only recourse left for the surgeon is, to cut down on and tie the main arterial trunk some distance above the stump, as in the treatment of aneurism. Even this, in some instances, has failed to arrest the flow of blood, this being kept up by the anastomosing vessels.

There is another form of consecutive hemorrhage produced by the necrosis of the end of the bone. At each dressing there is an oozing of blood between the dead and the living parts, which cannot be arrested except by the resection of the dead parts.

Phlebitis and *purulent deposits in the various organs* sometimes follow the operation of amputation, and these cases do not differ from those produced by other causes.

The *abscesses* and *sinuses* which sometimes form in the stump are also similar to those which are ordinarily developed under other circumstances. Sometimes the edges of the flaps unite, while the bottom of the wound suppurates, and the matter accumulates so as to form an abscess. Caries or necrosis of the bone, the irritating influence of the ligatures, &c., also conspire to favor the development of these abscesses. Sometimes the matter travels along the limb in the interstices of the muscles, or in the course of the synovial sheaths, and thus occasions extensive burrowing sinuses. The latter accident is more apt to occur after amputation at the wrist, or through the articulations of the tarsus, and in many instances it is necessary to make numerous incisions to give exit to the matter. This should always be done as soon as an abscess has formed in a stump, whether it be small or large, and if the pus has a free outlet, there need not be much apprehension entertained by its retarding the cure, unless there be some local cause to keep up the irritation.

Caries and *necrosis* of the end of the bone after amputation may result from several causes. The injury inflicted upon the bone itself will sometimes so far impair its vital power as to render it incapable of sustaining the integrity of its structure. A laceration or detachment of the periosteum, an insufficient covering of soft parts, either from the first or after cicatrization in consequence of retraction of the integuments, and ulceration of the cicatrix from pressure against the end of the bone; an inflammation of the medullary membrane, and sometimes, after amputation of the leg below the knee, the weight of the soft parts of the calf of the leg dragging so forcibly upon the skin at the angle of the tibia as to cause it to slough, may all cause the bone to fall into the condition of caries or necrosis.

All these causes must be avoided as much as possible. The retraction of the integuments may be generally prevented by the application of a bandage, which should be so adjusted as to counteract the contraction of the muscle; and when the caries or necrosis does take place, the surgeon must secure a free exit for the discharges, and pick away the pieces of detached bone. It will not be necessary to saw through the bone higher up, except where the protrusion is so considerable as to expose a great extent of its surface, and thus render it impracticable to cover it with the soft parts after the dead portion is detached. In some instances, however, this painful operation will become necessary, and in executing it, great care should be taken to detach the muscles from the bone to a sufficient extent to furnish an adequate covering for the latter.

A *conical stump* was an accident of frequent occurrence in the hands of the older surgeons; but the practice of healing the stump by the first intention has greatly diminished the number of such cases, and if proper precaution be observed in executing the operation, and conducting the subsequent dressings, it cannot take place except as a consequence of an extensive sloughing of the muscles and integuments. Where the protrusion of bone is slight, it may be safely left to nature, the surgeon contenting himself with the removal of the carious or dead bone, as soon as it becomes detached; but secondary amputation will in some cases be necessary here as in the previous case, and under the same conditions. This operation will also be necessary in some cases of extensive *gangrene* and *sloughing* of the soft parts, which occasionally take place after amputation, especially where the parts are not healthy or the patient is of feeble constitution, or has been addicted to habits of intemperance.

Various other accidents sometimes supervene upon amputation, which, however, it will not be necessary to describe, as they must be treated upon general principles.

LECTURE XXXIII.

SPECIAL AMPUTATIONS—OF THE PHALANGES OF THE FINGERS—OF THE META-CARPAL BONE OF THE THUMB—OF THE WRIST—OF THE FORE-ARM—AT THE ELBOW—AMPUTATION OF THE ARM—AT THE SHOULDER JOINT—AMPUTATION AT THE META-TARSAL JOINTS.

I propose on the present occasion, gentlemen, to commence the consideration of the special amputations, and to demonstrate the methods of performing the particular operations. We will commence with the

Amputation of the Fingers,

An operation apparently very simple; and simple indeed, if you understand it, but not so simple if you do not. Suppose, for example, that you would remove the last phalanx of one of the fingers. This amputation should be performed by the single flap method. Seize the first phalanx between the finger and thumb; flex it; place the knife two lines in front of a line which you will perceive on the palmar surface, and carry the incision over the dorsum of the finger, convexing it slightly forwards, and forming your flap from the palmar surface. Unless you bear in mind the rule in reference to the position of the incision, you will fall on the bone instead of the joint, and be somewhat embarrassed in executing this apparently trifling operation. Where you wish to remove two phalanges, the operation is equally simple, if performed properly. Turning your attention again to the transverse fold on the palmar surface, you will find that it is directly in a line with the articulation. Your incision, then, must be made directly in a line with it; and, as before, your flap must be made from the palmar surface. I would state, however, that these operations are sometimes performed in a different manner: namely—by forming the flap first, by transfixing the finger just beneath the joint on the palmar surface, and cutting outwards to a sufficient extent, after which the joint is opened into as before.

It sometimes becomes necessary to remove the first phalanx from the meta-carpus. To do this there are two methods, both of which will do very well. By one a double flap is formed, in such a manner, that when the finger is removed there remains a V shaped flap wound; and the other method is what is known as the *oval* operation. The first plan is very simple. Seizing the finger in the left hand, and causing an assistant to draw aside the other fingers, place the knife on the fold of skin between them, and carry it directly back to the articulation; pass through it, and bring out the knife on the opposite side; then bring the two neighboring fingers together, and heal by the first intention. To promote the approximation of the fingers, the head of the meta-carpal bone is sometimes removed, by sawing it through obliquely.

Where all of the phalanges are to be amputated, they may be removed by a single sweep of the knife. Having flexed the fingers, insert the knife, draw it simultaneously through the four articulations, and then form a flap from the palmar surface.

It is sometimes necessary to amputate the

Meta-carpal Bone of the Thumb,

At its carpal articulation. Here it is necessary to form the flap from the flesh on the outer side of the thumb. Having placed the hand in pronation, draw the thumb out, insert the knife at the commissure, cut freely, and grazing the bone, reach the joint; pass through it, and form as large a flap as possible, by bringing the knife out opposite the meta-carpal articulation, grazing the bone the whole way. The *oval* method is as follows—If operating on the left hand, supinate it, and make an incision from one line above the carpal joint to the inner side of the first phalanx of the thumb; then pronate the hand, and continue the incision along the dorsal surface, until it reaches the point where it commenced, at an angle of about thirty degrees; divide the muscles adhering to the bone; open the joint from the dorsal surface; and dislocate the meta-tarsal bone outwards, and detach it from the flesh. You may adopt either of these methods.

Amputation at Wrist Joint.

Where you have to amputate at the wrist joint, your guides will be the styloid processes of the radius and of the ulna. The joint forms a curve between these, and in amputating here there are two methods. The first is, by placing palm to palm, with the thumb on one styloid process, and the index finger on the other, to flex the hand slightly; place the knife on one process, and, remembering that the articulation forms a curve, whose convexity is upwards, sweep round to the other; then to open the articulation, and form a flap from the palmar surface. The other method consists merely in transfixing the limb upon its palmar surface, in cutting outwards, and in making the flap as before, opening the articulation in front.

Amputation of the Fore-arm.

As regards amputation of the fore-arm, it has been recommended to perform the operation in the upper third; but I would remark that the choice of the site of the operation must be governed very much by the circumstances of the patient. If he is in easy circumstances you should save as much of the limb as possible, and therefore, should cut low down; under other circumstances you should operate at the point of selection, the upper third. You may operate here by single or double flap, by double or single circular incision, &c.; but you must remember that you have here two bones, with an interosseous membrane between them; and that this membrane must be divided. If you amputate by the double flap, the easiest method is the following—Stand on the inner side of the arm, and pronate it; then transfix it, and cut the flap from within outwardly. Next supinate it, transfix it, and cut outwards; and then, by a circular incision around, the knife entering the interosseous space and dividing the ligament, cut to the bone. In these operations a retractor should always be used to protect the soft parts; and where there are two bones the retractor should consist of three strips.

Amputation at Elbow Joint.

In some cases it becomes necessary to amputate at the elbow-joint. Here it is advisable to save the olecranon process, as this may be easily removed afterwards, if necessary. The operation is easily performed. Placing yourself on the inner side of the arm, and marking the sides of the joint with the thumb and finger, elevate the flesh in front, or as much of it as possible; transfix it with a double-edged knife; and, by cutting outwards, form a flap of about three inches in length, having grazed the bone the whole way. Then, an assistant holding back the flap, insert the heel of the knife into the radio-humeral articulation, and by a circular incision at its base, divide the integuments behind; when, having reached the ulna, if you would save the olecranon, withdraw the knife; divide all the humero-cubital ligaments; and, dislocating the joint widely, pass a saw in and cut off the process, which will be held in its position by the tendon of the triceps attached to it.

Should you desire to remove the olecranon, after luxating the joint, divide the lateral ligaments of this process from behind, and then it only remains to cut across the tendon of the triceps muscle.

*Amputation of the Arm,**

May be performed either by the circular incision, or the double or single flap, and upon any part of the member. In all cases, however, the limb should be amputated as low down as the condition of the parts will admit, so as to secure all the advantages afforded by a long stump. When you operate by the double flap, it is advisable to cut the anterior flap first, as the biceps muscle in front retracts more than the triceps behind; and when operating by the circular incision, it was proposed by S. Cooper to divide the biceps simultaneously with the skin, by the first incision, so as to suffer it to retract before the knife is carried through the deep-seated muscles.

It has been advised by some, that when it becomes necessary to amputate above the attachment of the deltoid muscle, it would be better to operate through the shoulder joint, because of the great liability of the pectoralis major and other muscles to contract and leave the bone naked, or the immobility of the stump. The operation through the bone, however, is less hazardous, and should be generally preferred. Several methods of performing it may be adopted. The following plan I have found to succeed very well. Bring the patient to the ege of the bed, and extend his arm to a right angle with the body. Let an assistant compress the artery against the first rib, or against the articulation of the shoulder, as I have been obliged to do on account of a peculiarity in the conformation of the chest, by which the elevation of the clavicle was greatly increased. Stand on the outside of the member, introduce a long double-edged catlin about the middle of the deltoid muscle, a little below the acromion process, and thrust it directly through, in front of the bone, so as to bring out its point in the axilla, behind the fold formed by the pectoralis major. The instrument must then be made to cut itself out, by being carried obliquely downwards, and an anterior flap will thus be formed, comprising half the deltoid and the outer portion of the pectoralis major. The knife must now be insinuated at the same point, and thrust through in the same manner behind the bone, so that, in cutting itself out, a posterior flap of similar form and dimensions may be made. The flaps being turned back, a circular sweep of the knife must be made around the bone, and the operation finished by sawing the bone, securing the artery, and adjusting the flaps so as to have their line of union placed in a perpendicular direction.

---

* The description of this operation is taken, in the most part, from Prof. G.'s article on the Arm in the American Cyclopædia of Medicine and Surgery, vol. ii. [Ed.

Amputation at the Shoulder Joint.

We now come to amputation at the shoulder joint. There are a "*hundred and one*" different methods of performing this operation, any one of which will answer, provided the anatomy of the part be thoroughly understood. My usual plan is, to place the arm in an oblique position, inclining slightly outward and downward, to feel for the acromion process, present the knife there, and carry it with an easy curve round to the axilla; then, placing the arm more in, so as to expose the head of the humeris, to enter the joint, and carrying the knife through it, to cut obliquely out, thus forming an anterior and a posterior flap, an assistant holding the axillary artery between the fingers until it can be secured.

Another method is that of Lisfranc. There exists, between the coracoid and acromion processes, a triangular space, having the clavicle behind, and nothing but fibrous tissues above. If you are operating on the left arm, carry it outward until it stands at nearly a right angle; place yourself behind the patient; take the arm in your left hand, the two first fingers being placed on the triangle alluded to above, and the thumb resting on the posterior surface of the humerus; then plunge in a double-edged knife, about eight inches long, on the posterior border of the axilla in front of the tendons of the latissimus dorsi and teres major, and parallel to the outer side of the humerus, the blade resting in such a position that its flat side may form an angle of 35° with the axis of the shoulder, and having its upper edges a little in front. The knife grazes the external and upper surface of the humerus, and arrives beneath the acromion. Then depress the point and raise the handle, forming an angle of 30° to 35° with the axis of the joint; separate it from the arm for two or three inches, and then press directly with the point, which, passing through the joint, appears in front of the clavicle on the inner side of the acromion, in the triangle previously spoken of. Then, the handle remaining almost stationary, carry the end of the blade from within outwards, and a little upward, passing around the head of the bone, and, as soon as disengaged from between it and the acromion, the knife can descend freely on the outside of the arm, and cut a posterior flap about three inches long, which an assistant should instantly raise. Next, keeping the hand depressed, and cutting with the knife from heel to point, pass it from behind forward on the inner side of the head of the humerus; depress the handle till it becomes perpendicular to the horizon; pass the knife on the inner side of the bone; and, an assistant compressing the artery, finish the anterior flap.

When you amputate the right arm, you may either pass the knife in at the indicated triangle, bringing the point out in front of the posterior part of the axilla; or, standing behind the patient, you may make the first flap as before, and stepping to his side, finish the anterior. You may adopt either of these expedients as you please. I generally adopt the first, and find no difficulty in performing the operation.

Amputations of the Tarso-Metatarsal Joints.

As the same rules apply to the amputation of the *toes* as to those of the fingers, we will not repeat them here, but go on to the amputations of the tarso-metatarsal joints.

Where you would remove all the meta-tarsal bones at once, it becomes especially necessary that you should perfectly understand the anatomy of the parts. In consequence of the second articulation being so far behind the others, it is impossible to open it by the same incision that opens the others. The method of performing the operation is this: Placing the heel near the edge of the table, apply the palm of your left hand under the sole of the foot, your thumb resting on the tuberosity of the fifth metatarsal, and your index finger half an inch in front of the internal side of the joint. Next, make a semilunar incision across the dorsum of the foot, from without inwards, extending down to the bone, and passing half an inch in front of the articulation, while an assistant retracts the skin, and if the tissues will not yield, they must be dissected up. Then attack the articulation, without removing the fingers of the left hand, which serve as guides; place the point of the knife on the outer side of the joint; open it as far as the third metatarsal bone, and carrying the knife half a line forwards, cut almost transversely, and thus reach the second metatarsal. Dividing the ligaments with the point of the knife, then, the index finger serving as a guide, enter the joint on the inner side. The mortice is now to be destroyed. Pass the point of the knife between the first cuneiform and the second metatarsal bone, with the edge turned towards the leg, and forming an angle of 45° with the toes, and, the instrument having entered the joint, bring the handle to the perpendicular and cause it to pass through the internal side of the mortice, not forgetting its slight obliquity inwards. Next, withdraw the instrument, and carry its point transversely on the dorsal ligament at the posterior part of the mortice, and then from behind forward on the outer ligament; bear gently on the end of the foot, to separate the articulating surfaces; with the point of the knife divide the external and then the middle interosseous ligaments, from above downwards, and terminate the operation by dividing all of the plantar ligaments, and forming a flap from the sole of the foot.

LECTURE XXXIV.

AMPUTATION OF LOWER EXTREMITIES CONTINUED—THROUGH THE TARSAL BONES—CHOPART'S OPERATION—METHOD OF CHELIUS, LISFRANC, AND OTHERS—AMPUTATION AT ANKLE JOINT—OF THE LEG—RESECTION OF BONES AT THE KNEE JOINT—AMPUTATION OF THE THIGH—AT THE HIP JOINT.

In our lecture of yesterday, gentlemen, we pointed out the method of amputating between the tarsus and meta-tarsus. When the disease extends so high as to render this operation impracticable it may be advantageous to resort to the

Amputation through the articulations of the Tarsal Bones.

We here operate through the articulation of the astragalus with the scaphoides, and that of the calcis with the cuboid. But where the disease merely implicates the cuboid and the corresponding meta-tarsal bones, only these bones should be removed.

Chopart's method of operating through the tarsus is one of several which have been proposed. The object of this plan is to form a double flap, one from the dorsal and the other from the plantar surface of the foot. The patient is seated, and an incision is extended across the instep two inches in front of the malleolus, from one edge of the foot to the other. From the angles of this incision another is carried upwards to a small extent upon the tibial and fibular margins of the foot. The quadrangular flap of integuments thus formed is dissected back to the line of the articulation, the knife plunged into the latter, through which it is carried so as to divide the ligamentous connections, while the foot is strongly flexed, and after it has completely severed the attachments of the bones, the edge is turned forwards and carried along the lower surface of the bones, in order to cut a flap of the requisite dimensions from the sole of the foot.

This operation may be very promptly executed by one who is conversant with the arrangement of the articulations by the method pursued by Richeraud, Chelius, Klein, Lisfranc, Velpeau, and others, and this plan is preferable to any of the others. Everything being properly disposed, if the operation is to be performed on the left foot, the surgeon fixes the index finger of his left hand upon the articulation of the calcis with the cuboid bone, which will be found half an inch behind the prominence formed by the posterior extremity of the meta-tarsal bone of the little toe, and his thumb upon the tubercle of the scaphoid bone, the palm of his hand grasping the sole of the foot. Then, inserting the edge of a narrow bladed catlin upon the point marked by the thumb, he makes an incision across the instep to the point represented by the index finger. This incision should present a convexity towards the toes, and should be carried through the superficial parts, which retract as they are divided. The instrument should next be inserted in the articulation of the head of the astragalus with the scaphoid, and while the ligaments are divided, the foot should be luxated downwards so as to open the joints and allow the knife to glide through them. After the attachments of the bones have been cut asunder, the operation is completed by forming a flap from the sole of the foot. As the articulating surface of the stump presents considerable thickness, it is important to give the flap considerable dimensions: hence it has been properly recommended by Klein and others to make it of the length of the meta-tarsal bones.

Amputation at the Ankle Joint.

You will occasionally meet cases in which it will be necessary to sacrifice the whole tarsus. Under these circumstances—especially if the patient is in good circumstances—it will be necessary that you should save as much as possible of the limb, and you may then operate through the *ankle joint*. The plan is: first, to remove the entire tarsus, and form a flap from the sole of the foot; and, secondly, to saw off the malleoli, and bring up the flap over the surface of the articulation. Stand in front of your patient; (who should be placed as for amputating the leg,) seize the foot in the left hand; place the knife on a line with the internal or external malleolus; carry an incision along the side of the foot to a sufficient extent to form the flap, then directly across the sole and along the side of the foot, to the malleolus of the opposite side; and dissect back the flap. Next, cut across the joint in front; divide the ligamentous structures; carry the knife back; and dissect off the structures under the os calcis. Then saw off the malleoli, and bring the flap up over the stump, thus forming a soft cushion sufficient to bear a certain amount of pressure.

Amputation of the Leg.

It very frequently happens that we are under the necessity of amputating the leg, and it has long been supposed that the preferable point for the performance of this operation, is about three inches below the knee. This, therefore, has been called the *point of election*. The reasons for this preference are the amount of muscular substance at that point for forming the flap, and the absence of tendons.

Now, where the individual is in such circumstances as may enable him to obtain a wooden leg, it will be well to amputate at the point of election; but where his circumstances are different it will be best to amputate as low as possible, that he may enjoy the comfort of an artificial leg and foot, which will in a great measure correct the deformity.

I may state, in general terms, that the operation may be performed by the *double circular incision*, or by the single or the double flap method.

The English and American surgeons generally prefer the double circular operation in this as in most amputations: but for my part, I think that it is too protracted, and that it possesses no advantages over the flap operations. Either method, however, will do very well.

When you adopt the single flap amputation, the flap is formed from behind; and although it is certainly true, that when you operate by this method in the upper portion of the leg there is no difficulty in obtaining a flap sufficient to cover the stump, it is equally true, as I have always observed, that there is a proclivity in a flap thus formed to fall down from the bone; and it is also true, that, on account of the fact that the long end of the muscles are thus left unattached, the flap is apt to slough. So that, although I have several times performed the operation with a single flap, I have long abandoned the method. and now generally adopt the double flap plan of amputating the leg.

When you operate by the single flap, placing yourself on the inner side of the patient, you feel for the margin of the tibia; transfix the leg; behind and grazing the tibia and fibula, cut downwards and backwards to form a flap of sufficient size. Then, grasping the knife firmly, you place the *left* foot forwards—not the *right*, for the knee would then be in the way—carry the heel of the instrument over to the margin of the flap, and divide all the integuments and muscles in front of the leg by a circular incision on a level with the base of the flap, which an assistant in the meantime retracts. With the point of the knife you next divide the interosseous membrane, and then you saw the bones. The angle of the tibia, being drawn up by the muscles, is apt to project, and remain uncovered by the flap. I generally, therefore, saw off the sharp upper edge, by simply inclining the instrument, and bringing it to bear at first in an oblique direction for several strokes upon the bone; and then, removing the saw from the inclined groove thus madé, I divide the bones on a line with the end of this first section; thus, as it were, notching out an angular shaped piece from the tibia, and giving to its end a bevelled edge.

I will now describe to you a more simple method, and the one which I generally adopt. In the first place, you feel for the fibula, and draw out the integuments and muscles: next you cut obliquely in on one side to the bone; and then you reverse the knife, and cut obliquely upwards on the opposite side; thus forming an external and an internal flap of equal length; which being reversed, and drawn up, the deep seated muscles, together with the interosseous ligament, are to be divided in the usual manner, by a circular incision around the limb, carrying the point of the catlin between the tibia and fibula.

Excision of Bones at the Knee Joint.

It may sometimes be necessary, instead of amputating the limb, only to cut out a portion or portions of the bones, as, for example, the head of the tibia or femur, or the extremities of both bones.

The necessity for performing this operation is generally produced by some diseased condition of the joints. The method of performing it is as follows—Place the leg in a slightly flexed position, insert the knife above the patella, and make an incision which will pass around the anterior half of the limb: then commence at the same point, and carry a second incision below the patella to the side opposite to the termination of the first incision, cutting boldly down to the bone: and lastly, place the leg in such a position that the bones may stand perpendicular; divide the crucial ligaments, and saw off the heads of the bone or bones, or as much as it may be necessary to remove, taking care not to wound the popliteal artery. Afterwards place the limb in a straight position with the square ends of the bones together; apply splints, as for fracture; and endeavor to procure bony union. Of course the joint will be permanently stiffened by this union.

In reference to the sawing of the bones of the leg, there is one rule—though of little importance—to which I will direct your attention. You will find that at the upper end of the tibia the articulation of the fibula is oblique with the tibia, and that the bones are held in position only by the articular ligaments; and in consequence of this arrangement, if you saw these bones together, the fibular will slip downwards an inch or so below the tibia. On this account, I am in the habit of dividing the fibula first; and then I insert the saw on the tibia on a level with the divided end of the fibula.

But, to go on, let us pass to the

Amputation of the Thigh.

You may operate here, as in the leg, by the circular incision, or by the single or double flap method; and the flaps may be formed from the internal and external, or the anterior and posterior portions of the limb. I prefer the lateral—the external and the internal—to the anterior and posterior operation. The latter method allows the secretions to collect, while the former plan gives them free exit. The double flap method is to be preferred; and in performing the operation by this plan, the two flaps may be formed either by cutting from the bone outwards, or from without inwards.

There can hardly be said to be any particular point of election in amputation of the thigh: we should operate at the point which the necessities of the case indicates, without sacrificing more of the limb than is necessary, except where the artery passes through the tendinous sheath, formed by adductor muscles.

The operation should always be regarded as one involving hazardous consequences. The amount of soft parts which have to be divided is so great, that the constitution sometimes receives a shock from which it never recovers, and should this not happen, the patient is not unfrequently destroyed in the end by irritative fever, profuse suppuration, and even gangrene.

When you determine to operate by the double flap method, and to cut the flaps from the bone outwards, you place the patient upon a table properly arranged; cause an assistant to command the artery, either by means of the tourniquet applied high up the thigh, or by compression where the artery is passing over the horizontal branch of the pubis; and, placing yourself in front of the patient, you insert the knife as though you were about to pass it through the thigh bone; but turning the point of the instrument around it, you transfix the limb, and then form the flap by cutting out. After doing this, you again insert the knife at the same point, and cut out at the same angle on the opposite side, taking care, here as with the first flap also, to secure an ample fold of the soft structures to cover up the bone securely.

Should you desire to perform the operation by cutting the flaps from without inwards, the operation does not differ materially from that method when carried out elsewhere, as already described. The flaps should be made from the internal and external, rather than from the anterior and posterior portions of the thigh.

Sometimes, where there is a considerable loss of soft parts on one portion of the limb it may be desirable to operate by the single flap method. This flap may be cut from any portion of the limb; but should the condition of the structures leave it optional with the surgeon, the anterior part of the thigh should be selected. The soft parts should be pinched up between the thumb and fingers of the left hand, and a narrow catlin thrust through in a transverse direction in front of the bone so as to cut an anterior flap of the proper size. The parts on the posterior portion of the limb may then be divided by a half circular cut down to the bone.

It is unnecessary to describe the method of operating by the circular incision, as it has been spoken of elsewhere, and as it is performed in a similar manner when applied to the amputation of this limb.

Amputation at the Hip Joint.

We are sometimes driven to the unfortunate necessity of disarticulating the thigh at the hip joint. While I cannot agree with Charles Bell, that this operation ought never to be performed, I would restrict it to those cases in which amputation cannot be performed through the continuity of the bone, between the head and the trochanter minor, or lower down, provided, also, that the acetabulum and the adjacent parts of the innominatum be sound.

There are some dozen methods of performing the operation; and each one may succeed as well as another. The one which I prefer is that by which an external and an internal flap are formed, as follows. Draw the thigh over a table, and flexing it slightly, feel for the anterior superior spinous process of the ilium: then measure one inch and a half downwards from the spine of the ilium, and a half inch on the inside of the termination of this line insert the point of the knife. If you push the knife directly back, it will fall upon the rounded head of the femur. Do this; and when you feel the instrument impinge on the bone, incline the blade so as to graze it; draw the buttock outwards; bring the point of the knife through; and cut out. Next, insert the knife in the same manner, and cut the inner flap; and then, seizing the limb in your own hand, abduct it, and cut as though directly upon the head of the bone. Thus you will enter the joint; when you must divide the ligaments, and finish the operation.

LECTURE XXXV.

WOUNDS—DIVISION OF SUBJECT—SIMPLE INCISED WOUNDS—HEALING PROCESSES.

I propose, gentlemen, to commence to-day with the subject of *wounds*. We define a wound to be a *solution of continuity in the soft parts, inflicted by external violence.*

When we consider the subject under all its aspects, we see that wounds may be exceedingly diversified, in accordance with the kind of instrument by which they are inflicted, the nature of the part in which they occur, &c. But notwithstanding the endless diversity in their characters, and consequences, we may divide them all into a few groups. First, a simple cut, a "simple incised wound," is one inflicted by a merely cutting instrument. Secondly, a "punctured wound" is one made by a sharp narrow instrument. Thirdly, a "contused and lacerated" wound is one which is much bruised and torn; and, as a modification of this kind, we have "gunshot wounds." Again; when a poison has been insinuated, it is called a "poisoned," or "envenomed" wound. The bites of venomous animals, dissection wounds, &c., come under this head. You can readily perceive how convenient it will be, in the consideration of our subject, thus to divide it.

We will take up the separate groups in the order in which they have been mentioned; and to begin, we will call your attention to "*simple incised wounds.*" When a simple cut is inflicted in the soft parts, certain phenomena and changes occur which demand our investigation. Among the phenomena which present themselves are, first, pain—which differs in intensity, according to the sensibility of the parts affected, and which also differs in its duration—and secondly, a separation of the edges, or a gaping, more or less extensive, according to the direction of the wound, its extent, position, &c. The causes of this gaping are various. Thus when the instrument merely penetrates the skin, the cause is to be found in the elasticity, and organic contractility of that structure, and when the wound is deeper, muscular action is also brought into play to separate the edges. Again; some parts of the skin are less adherent to the subjacent structures than others; and hence wounds in such a part will gape more than where the skin moves with less freedom over the parts. For example, we may cite the fact, that wounds on the scalp gape much less than those on other parts of the body. In reference to the position of the wound as a cause, it is evident that if on a limb, it will gape more if it be in a transverse direction than if in the line of the limb. The position of the part, as to flexion and extension, also exerts an influence in opening the wound. But to return. Another of the sensible phenomena presented, (I am still speaking of simple incised wounds,) is a discharge of blood. In slight, superficial wounds, this is a mere oozing from the small vessels, and generally not much is lost; though *occasionally*, the discharge is considerable: while if the wound extends to any of the larger vessels, jets of blood will spout out synchronously, with the systole of the left ventricle of the heart. Again, we may have the discharge of some other material existing in the body; as the synovial fluid, for example, if the wound penetrates into the cavity of a joint: or a bursa mucosa may be involved in the injury, and *its* contents may be expelled; or the bile, urine, or contents of the intestines, may be discharged. These complications can, of course, arise only when the wound is inflicted in particular parts; and these phenomena do not properly belong to *wounds in general.* If the wound penetrate the lung, air may be discharged from the vesicles; and, by infiltrating into the cellular tissue, it may give rise to that condition denominated "*emphysema.*" Such, then, are the phenomena which present themselves when there occurs a "solution of continuity in the soft parts, from external violence." Others sooner or later succeed, which result from the processes that nature adopts to repair the injury, or *heal the wound.* These are resolvable into two processes, union by the "*first intention,*" and union by the "*second intention,*" as they are respectively called. The latter process is sometimes denominated "*healing by granulation.*" Let us see in what these processes consist, and in what respect they differ. In the first, or union by the first intention, a plastic material is thrown out between the opposing surfaces, and, by certain vital changes, is converted into a living portion of the organization. In the second,—that of healing by granulation—we find, together with the plasma, another material described already as pus. Suppuration, then, is essential to this mode of healing, but not to the first. In the mode of union by the first intention, adhesion sometimes takes place in twenty-four hours. Some think, that in these cases healing takes place by a direct union of the divided vessels, without the aid of any plastic exudation; but I am inclined to believe that the same laws are concerned, that obtain in cases of a more protracted character. Thus we see in a simple incised wound, that, after the hemorrhage has been arrested, a mould of coagulum may be found between the divided portions of tissue. Now, it is obvious that this must be removed before union can take place; for—notwithstanding the high authority of Hunter to the contrary—none now believe that this extravasated blood is capable of becoming organized. All agree, that it must be removed by being partly expelled, and partly absorbed. Coincident with its removal through these double means, certain other changes take place. These have, on a previous occasion, been carefully explained. The fibrine and albumen of the blood are increased in quantity; and an exudation takes place, consisting, at first of blood serum, and gradually containing more and more fibrine (or blood plasma, of which fibrine is the base) capable of becoming organized, and answering the purposes of nature in the process of healing and repairing lost structures. At first fluid, it becomes congealed, and its farther condensation gradually goes on. Meanwhile, the microscope evinces the presence of *granules;* which go on increasing in number, and are capable of undergoing such changes, as result in the formation of simple cell membranes enclosing nuclei, these being again composed of nucleoli. As these cells increase in number, they group themselves together in various ways, according to the nature of the structure about to be formed, which will be the same as that of the part in contact with which they lie. If it be cellular tissue, for example, they will be irregularly distributed; while in other cases, they may arrange themselves in a linear direction, &c., &c. Those in contact with the living structure undergo certain changes which result in their becoming organized. This occurs to layer after layer, until ultimately the cavity of the wound is filled, and the opposite vessels inosculate. This is the nature of the process, even in healing by the "first intention," as it is called. But the healing is not yet complete. The surface is moist; and there is still an exudation taking place. This becomes dry, and forms a scab, or incrustration, beneath which a new skin is being produced by the same process of cell-formation. A particular series of nucleated cells are deposited in regular layers, and form that arrangement called "epithelium."

As regards the mode of healing by the *second intention,* by *granulation,* by *suppuration,* I have already intimated that the process is the same, with one exception. We have the same exudation, cell production, &c.; but a portion of the plasma has become so deteriorated as to be incapable of undergoing, in a normal manner, those changes which lead to organization, and a kind of abortion takes place. True, a cell or globule is formed; but this differs from an organizable cell, as has been elsewhere explained. This process is infinitely slower than union by the "first intention." The pus globules interfere with the process, but by shielding the plasma, they are sometimes useful in the manner of a natural dressing to the parts. The process of healing is in both instances the same, although more tardy in the one case than in the other. A series of exceedingly minute granulations gradually fills the cavity; then cicatrization takes place, and beneath the incrustation the epithelium cells are arranged, and a new skin is formed. These are not merely interesting pathological considerations, but have a practical influence upon our treatment of wounds. The discovery of the doctrine of adhesion has, as has been remarked by John Bell, accomplished more for surgical science than even that of the discovery of circulation itself. Many are the surgical operations we would fear to perform, if we had not confidence in this principle in nature's operations.

LECTURE XXXVI.

WOUNDS CONTINUED—TREATMENT OF SIMPLE INCISED WOUNDS—SUTURES—SUTURA SICCA—SUTURA CRUENTA—TREATMENT OF CONTUSED AND LACERATED WOUNDS.

At our last meeting I attempted to portray the leading characteristics of simple incised wounds, and to explain the mysterious processes adopted by nature in repairing the injury. It will be my object, to-day, to point out the measures to be pursued in aid of these processes. In other words, to consider the *treatment* of these wounds.

We have already said that the healing of a wound is the result of one or the other of two processes, and that these are respectively denominated, union by the first, and union by the second intentions. We have also explained in what particulars these *processes* differ from each other. Our object in the *treatment* should be, as a general rule, to favor the healing by the "first intention." The means of so doing will be explained in their proper order. Meanwhile we will call your attention to some other points in the treatment. In a common incised wound, or, in fact, in any wound, extraneous bodies may be conveyed into the body, and they are liable to be retained there. Our first duty, then, is to ascertain if the wound contains any foreign material, and if such is the case, to remove it if possible. Another important duty will then be to *arrest the hemorrhage*. This will sometimes cease spontaneously; but if such be not the case, it becomes the duty of the surgeon to call into requisition all the means and appliances within the compass of his knowledge, or suggested by his ingenuity. I cannot here enter into a detail of all these means and appliances. Common cold or styptic applications may often succeed, but it will be sometimes necessary to tie either the divided ends of the bleeding artery, or its main trunk.

Our next duty will be to bring the edges of the wound into contact; and to fulfil this indication, involves several considerations. First, to obtain this end, the *position* of the part must be regarded. Let us, for example, suppose a transverse wound of the throat, and one on the anterior portion of one of the lower extremities. In the first case the head should be brought forwards, and in the second instance, the limb should be placed in extension. By acting thus, in both cases, the edges of the wounds will be brought into nearly perfect apposition. Position, however, is but one of the measures to be adopted, in ensuring the contact of the edges of a wound; there are others of much greater importance, and to these we must now direct your attention. In the *second place,* then, we will consider the *compress and uniting bandage.* The compress may be of various forms. It should be constructed of soft material, and it should be so placed as to bear on the edges of the wound, in order that when the bandage is brought to bear on it, its pressure will be exerted in such a direction as to approximate the divided surfaces. There is yet another means of union which we employ. It is called a *suture,* which term means *literally* a stitch. We have the *dry* suture or "sutura sicca," and the *bloody* suture or "*sutura cruenta.*" The former consists merely of adhesive strips, or of some glutinous substance; the latter presents a great variety of modifications. In most instances this last is made with a common needle and a ligature. The bloody suture which is most frequently resorted to, is the common interrupted stitch. A common curved surgeon's needle armed with waxed thread, is passed through both sides of the wound, at some distance from the edge, and tied over the line of division; and this is repeated as often as the extent of the wound renders it necessary. The approximation should be assisted by lateral pressure with the hand, while the thread is being tied. A more expeditious plan is to take a needle armed with a long thread, and pass it through on alternate sides, leaving long loops on each side, which are afterwards cut, and the opposite ends are tied as in the first case. In other instances, especially in cases of wounds about the abdomen, perineum, &c., we use what is called a *quilled* suture. A curved needle with a strong double ligature is passed, as in the other cases, and tied over a quill or bourgie, which is placed in the line of the punctures. The stitches in this case, not acting so forcibly on the edges of the wound, are not so apt to cut through. This suture also keeps the deeper parts more exactly in juxtaposition, and it should be preferred in wounds about the abdomen. Again; we should mention the *twisted* suture. It is used in the operation for hair-lip and in wounds about the eye, &c. Straight needles, either of silver or steel, (a common sewing needle will answer) are passed, in sufficient numbers, across the wound. Over each of these a ligature is passed in a twisted or figure-of-eight direction, and drawn sufficiently tight to ensure the approximation of the parts. There are other modifications of the suture, but as they are of minor importance, I need not take up your time with their explanation.

In common wounds, the interrupted suture is generally the best you can choose. If the nature of the wound render it possible, you should use but the dry suture, since no additional injury is inflicted by it. If you are obliged to resort to the "sutura cruenta," you may, according to the position of the wound, its character, &c., use either of the three mentioned, alone, or together with the "sutura sicca."

In some cases the loss of substance may be considerable, and yet it is desirable that the wound should heal by the first intention. If, in such a case, the sutures fail in obtaining the requisite approximation of parts, we have to resort to other plans in addition; for without due contact between the divided surfaces, union by the quicker process cannot occur. Modifying the relative position of the adjacent parts, will often avail much in this respect; and thus, too, we may use the surrounding parts to supply the place of the lost tissues. For example, we may sometimes cause the requisite approximation, by dissecting the skin from the subjacent tissues, and availing ourselves of its natural elasticity extend it so as to fill up the space. We may also resort to lateral incisions, which will allow a sufficient extension of the skin. Gaping will take place, but this will soon be filled up by the neighboring parts, or by new products.

It will be proper, in the next place, for me to consider briefly the other collateral circumstances in the cure. Quiet and rest should be enjoined on the patient, and we should see that all the vital functions are regularly performed.

In all processes of healing, a certain degree of inflammatory action is necessary. This may, on the one hand, transcend the requisite degree of intensity; or it may, on the other hand, become too slight. If the inflammation is of too intense a character, the antiphlogistic treatment should be enforced, in due accordance with the state of excitement; the diet should be regulated; and pain, if present and severe, should be alleviated or relieved.

Besides this constitutional treatment, local measures have heretofore engaged much attention; but as our science advances, we find that the more simple applications are the best. We are chary of too much dressing, and manipulation. Besides, the approximation of the edges, the best local treatment consists of simple water dressing, either cold or tepid, and applied either by means of lint, or soft, spongy, bibulous paper.

In some cases, you *may* find some of the antiphlogistic applications of benefit—sugar of lead, for example. In endeavoring to heal a wound by the first intention, you should avoid the popular application of warm poultices. They are calculated to excite suppuration. We should always try to heal by this "first intention," and if we fail in our attempt, we can *then* modify our treatment to favor suppuration and granulation. It will then be time enough to apply warm poultices.

LECTURE XXXVII.

CONTUSED AND LACERATED WOUNDS—THEIR TREATMENT—PUNCTURED WOUNDS—THEIR TREATMENT.

I have mentioned, that what we call contused and lacerated wounds are generally produced by blunt instruments, though this is not invariably the case. Hence we may have a wound that is lacerated, without the laceration being accompanied by contusion; and we may have considerable contusion, without laceration, or, at least without laceration of the integuments. A mere contusion may result from a fall, or a blow, and the skin remain untorn. In such a condition, however, it will very frequently be the case that there is laceration. Beneath the skin, in the delicate structures there situated, laceration may exist. Minute vessels may be torn asunder, and their contents extravasated into the interstices of the areolar tissue of the part. Hence arises what is called "ecchymosis;" which is nothing more than a dark colored effusion from these ruptured vessels. Ecchymosis, then, may be one of the phenomena in contused and lacerated wounds. Other characteristics follow, among which an impairment of the vital properties of the part may be noticed; and this may be exhibited in various ways. If it is merely a temporary suspension of the natural functions of the part, the vital powers will soon recover themselves, and resume their action; but if the injury is more severe, mortification, to a greater or less extent, may result. All these circumstances will modify both the prognosis and the treatment, and, therefore, should all be taken into consideration. The complications existing in these cases are infinitely varied. Some of the wounds are longitudinal, relatively speaking; some transverse, &c.; in some there may be laceration of important vessels, and in others, vessels may be torn asunder. The hemorrhage is not so great as in simple incised wounds; and even when the principal artery of the part is severed, there is sometimes no alarming hemorrhage, and no ligature may be needed, the blood soon ceasing to flow of itself. But this is not always the case. Sometimes, if the vessel is by some means prevented from contracting, great loss of blood may take place. All I wish you to understand me to affirm is, that such wounds are *less apt* to be followed by serious hemorrhage, than simple incised wounds. Pathologists have attempted to explain this, but the discussion of these explanations will be more appropriate in another part of the course.

The *pain* resulting from a contused and lacerated wound is often less severe than when a smooth cut is inflicted; and secondary bleeding is more frequent than in an incised wound.

We have already seen that the vital powers of the part are impaired, and that often a portion of the tissues becomes dead, or mortifies. Now, as soon as this dead portion becomes detached, the vessels are no longer closed, and the bleeding comes on. Many examples of this *secondary hemorrhage* are seen in common gunshot wounds, in which the ball has raked the coats of a vessel.

Another peculiarity in these wounds is the fact that they very rarely unite by the first intention. The *rule* is, that they heal by suppuration and granulation, though there are exceptional cases. As a general rule, too, it may be stated, that *prostration* more frequently follows, as a result of lacerated and contused wounds, than in cases of simple incised wounds. That paleness; that slow and heavy respiration; and those nervous symptoms, represented by the term *collapse*, are more apt to present themselves in these injuries.

Such, then, in a general manner, are the characteristics of a lacerated and contused wound. Let us now consider the duties of the surgeon in such a case.

In a case of simple contusion, the injury is *generally* superficial, though not always so, and the parts are restored to their normal condition by resolution. The extravasated blood is absorbed, and the part recovers its vital powers; the pain subsides, and the vessels resume their offices. The best plan to be pursued is simply to rest the part, and apply to it some stimulating or evaporating lotion. In some cases, the blood which has been extravasated may act injuriously on the surrounding parts, by exciting abscesses, by pressure, &c., and although you should not be anxious to evacuate such a collection, yet it is sometimes best that it should be discharged. Such cases are instances of what are called *bloody abscesses*. They occur especially on the head; and, as occurring there, they will be referred to hereafter.

In *lacerated and contused* wounds, the same treatment, with some modifications, should be pursued, as in wounds of an *incised* character. Any foreign material, or extravasated blood, should be removed; the advantages that may be derived from position should be secured; and the requisite sutures, compresses, &c., should be applied. You may—in fact, you often will—fail to obtain union by the first intention; but, having approximated the lips as near to each other as possible, you by so doing place the wound in the best condition for a rapid cure by the second intention. Again: we sometimes find that the parts are so extensively lacerated, as to induce us to conclude that their vitality is destroyed; though it will often be found to be the case, that portions of structures, even black with contusion, if placed under proper circumstances, will rally their vital powers and recover. By allowing such parts to remain in situ, though some portions may slough off, we can, at any rate, console ourselves with the consideration that nothing has been unnecessarily lost. You may, moreover, save much time in the cure by pursuing this course. An external flap may be torn up, and turned back. In such cases, as suppuration is almost inevitable, a compress should be applied to keep the flap down, after it has been restored to its position; and if pus should accumulate beneath it, it should be punctured in its most dependent part.

If the inflammatory action should transcend the proper limits, as we said yesterday, the proper remedies for inflammation should be applied. Here, however, we must be cautious. It should be borne in mind, that the suppurative process will constitute a continued draught on the constitution; and therefore the system should not be reduced too low by antiphlogistic remedies. Sometimes, in fact, it will become necessary to immediately change our tactics, and to resort to a tonic, and occasionally even a stimulant course of treatment.

As regards the *local* treatment of contused and lacerated wounds, I would recommend, in general, the use of cold, or tepid water dressing, as in the treatment of simple incised wounds. The water may be applied also by irrigation, that is, by keeping up a constant flow of water over the part. For this purpose, it is not necessary to have any complicated apparatus. A pail of water, a flexible tube, and a piece of oiled cloth to turn off the water, are all that is requisite.

Such, then, will be the treatment, in ordinary cases: but if extensive sloughing is about to come on, or there is great engorgement of the lips of the wound. warm fomentations and poultices should be applied. Narcotic infusions, or infusions medicated with chloride of lime or soda, may be used with advantage, as stated in our remarks on the treatment of gangrene. When suppuration commences, the same treatment should be pursued, as if it were a simple granulating ulcer.

We will now direct your attention to another class of injuries—those called

Punctured Wounds.

We find that when a smooth and round instrument is inserted into the human body, the wound thus produced does not assume the shape of the weapon. Instead of the opening in the tissues being round and smooth, it is for the most part triangular, or ***stellated:*** and this is more apt to be the case, if the instrument is conical in shape. The fact should be borne in mind, as it may become of some importance in a medico-legal point of view. Such a weapon does not *cut* its way, but *forces apart* the tissues with such violence as to tear them, and thus form in them triangular, or stellated slits. Hence, such wounds are in reality of the *lacerated* kind. But the instrument may be of such a character, as to act both as a wedge and as a cutting implement at the same time; and thus the wound may be ***both lacerated and incised.***

The complications met with in ***these*** wounds are also various.

They differ as to the depth to which they extend, the part in which they occur, the variety of tissues involved, &c. These complications are common to all wounds, and lead to various special results; though there are some consequences which, for the most part, are peculiar to punctured wounds, and should be considered as resulting from them. Even in cases in which the puncture is slight, after the lapse of some time, the part becomes tumid and painful, and even rigors and fever may supervene. Meanwhile, the limb continues to become more and more tumefied, and its heightened temperature denotes increased inflammatory action. Generally speaking, in such a case, though it may not be apparent, there is a collection of pus, or commencing suppuration; and this may be at the bottom of the puncture. The inflammatory action excited by the instrument may even affect the deeper parts; and, as the result, an accumulation of pus may there take place. The abscess thus formed, being bound down by tough fascia, dissects its way through the more delicate tissues; and this gives rise to an augmentation of the intensity of the symptoms.

Again: another result which may follow these injuries is ***tetanus.*** After a few days, we find that the patient complains of rigidity of the muscles of the jaw. This rigidity extends to the rest of the muscular system; and soon universal spasms occur, and tetanus is developed. Even a slight puncture may thus cause the death of the patient, especially in individuals of the Ethiopian races. It is our duty, in such wounds, to remove all extraneous matter with especial care. We should not depend on what the patient says, as regards this point. He may be mistaken in his impression that nothing remains; and by heeding his assertions, the golden opportunity for warding off the attack of tetanus may be entirely lost, and the death of the patient be the result of our credulity; for, after the convulsive symptoms appear, we can do but little for our patient, except to alleviate his sufferings, till death puts an end to them. All this may perhaps be the result of the irritation from the presence of some foreign material, in what may be an otherwise trifling puncture.

There is one important point in the treatment of this class of injuries, which is involved in some difference of opinion. Some surgeons advise, that, as a general rule, these punctures should be converted into incised wounds by means of a scalpel, in order thus to facilitate the escape of any purulent collection which might otherwise be retained in the lower portion of the wound. Others advise, that *at first,* they should be treated as other wounds; but that they should be watched with attention, so that whenever it may become necessary, they may be opened, or dilated, to admit of the evacuation of any purulent collection which may have formed. I am most inclined to the adoption of the latter course, except in certain cases, as in wounds in the palms of the hands, the soles of the feet, &c. In such cases, I adopt the first method, and also endeavor to promote suppuration; for tetanus is less apt to ensue after suppuration, than when the wound is closed by an early union.

LECTURE XXXVIII.

GUN-SHOT WOUNDS—THEIR PECULIARITIES.

We design, to-day, to call your attention to that particular kind of contused and lacerated wound caused by shot from fire-arms. When we consider the great variety of these fire-arms, we at once perceive that the injuries produced by them must be in a high degree diversified. It will be convenient for me to direct most of my remarks to that kind of wound which results from a common ball. Such a wound will present various aspects for consideration, dependent on the different degrees of force with which the ball has been expelled. The ball may enter the body, and remain in it; or it may be expelled from the barrel with sufficient force to pass through. In the latter case, we will of course have two orifices, the one of entrance, the other of exit. These will differ in some respects from each other. The first will be the smaller, and more uniform; the second larger, and more lacerated and uneven. This is the general rule, though such will not *always* be found to be the case: in some instances, the reverse condition may be observed. This has been proved by some of the French surgeons, some of whom even contend, that what is considered the exception constitutes the rule—that the law should be reversed. My experience does not support this view of the subject. The structures corresponding to the orifice of entrance are, it is true, most injured. Though less *lacerated,* they are more *contused,* as the greater force has been expended on them. The track of the ball is somewhat conical in shape, the apex of the cone being placed at the orifice of entrance, and its base at that of exit. This particular shape is caused by the progressive diminution of resistance to the passage of the ball from its entrance to its exit. The skin being very extensible, as the ball passes out, is projected forwards and lacerated the more, since it has not that support which the integument at the orifice of entrance derived from the subjacent issues.

In many cases of gun-shot wounds, the ball, in consequence of the various obstructions which it is liable to meet with, is turned from its course, especially if its velocity is enfeebled; and such may be the result when it impinges on the surface of a bone; though this is by no means the only structure which is capable of glancing a ball. Cartilages, aponeuroses, tendons, may all turn the course of a ball, especially if its force has been diminished by the distance it has traversed, or otherwise. The ball may even then escape from the body; or it may be lodged in its structures; or it may penetrate some of its cavities, and may, or may not, enter the organs therein contained. A very *slight* resistance will sometimes glance a ball. A case has been recorded, in which a ball striking the thyroid cartilage, glanced round the neck, and lodged opposite its entrance; and some extraordinary instances of the glancing of balls have occurred in wounds on the head. They have, in some instances, raked almost entirely round the cranium; and even the dura mater is capable of turning a ball, after it has passed through the skull, and causing it to pass round, and even break out again, thus glancing it round even a *concave* surface. This seems, at first, difficult to understand; but if a ball be driven with the proper obliquity against a concave surface, it will easily glance round it. A case has occurred, in which the ball passed *between* several folds of the intestines, and lodged in the iliac region.

But let us return to a consideration of the character of these wounds. Sometimes the ball shatters some bone, and a compound comminuted fracture is the result. If, however, the bone is of the *spongy* character, the ball may enter and become imbedded in it; and in such cases the contraction of the bone, after the passage of the ball, may lessen the size of the opening through which it has passed, and thus render the extraction a difficult matter. Again: the ball may injure an artery; and, although at first there may be no bleeding, secondary hemorrhage may come on, and a diffused aneurism be the result. Nerves also may be injured, and partial paralysis be the consequence. The ball will sometimes carry into the tissues some portions of the dress of the person, or some other substance, and leave them there; even, sometimes, when the ball itself has passed through. In those cases in which the organs in the *thoracic cavity* are involved, the injury is of course of very great importance; and such is also the case in respect to the abdominal organs. In these latter instances, the patient generally dies of *peritonitis*. If the *gall bladder* or the *biliary ducts* are opened, their contents are immediately thrown into the peritoneal cavity, and inflammation is lighted up by their presence in contact with this delicate tissue. Such injuries are generally fatal. If the *stomach* or *intestines* are penetrated, their contents also escape, and peritonitis results. So also is it with the bladder, ureters, &c. But in the consideration of gun-shot wounds, there are other collateral circumstances to be discussed. An injury, even of a fatal character, may result, when the ball itself has not touched the individual. In naval battles, for example, splinters of wood, and other substances, may be propelled against the body. So, on the battle field, a ball may strike the ground, and project any substance from its surface against the soldiers in its vicinity.

As in other contused and lacerated wounds, primary hemorrhage, to any amount, seldom takes place, even if the injury involve some important artery. Secondary hemorrhage is more frequent, from the detachment of the sloughs from the injured coats of the vessels.

It was formerly supposed that there was something peculiar in gun-shot wounds, rendering them different from all other kinds of contused and lacerated wounds. The ball was suspected to be poisonous; and with this idea in their minds, various methods of treatment were adopted by the surgeons and others, which have now fallen into merited disuse. On fields of battle, bodies are sometimes found devoid of any apparent injury, and yet dead. Such deaths were for a long time supposed to result from "the wind of the ball," as it was termed. Explaining the result from the phenomena of succussion, many have supported this popular supposition. Experiment, however, has proved, that the disturbance of the atmosphere is not capable of producing death. In all such cases, the cause of death may be revealed by the use of the scalpel. Internal contusions, sufficient to produce death, will always be found.

The consequences resulting from gun-shot wounds are of course infinitely varied. Slight inconvenience only may ensue, or death may be the result, according to the character of the wound. The pain is sometimes but slight; while at other times it is very great; even when the wounds are to all appearances similar. Generally, there is produced a train of symptoms indicating a *shock* to the system. A paleness comes over the face; a weakness and faintness is felt; the pulse is feeble; the respiration is oppressed; and this sinking may continue even to the cessation of all the vital processes. These phenomena may succeed even a slight injury. They may, too, become apparent even in the person of the boldest warrior. One who previously was brave and dauntless, may lose all his physical courage, and become a trembling, even a fainting coward. Even moral courage of the highest order may give way, in some individuals, from a mere scratch.

LECTURE XXXIX.

TREATMENT OF GUN-SHOT WOUNDS—POISONED WOUNDS—SNAKE BITES, STINGS OF INSECTS, &C.—TREATMENT.

We will now briefly call your attention to the proper *treatment* to be pursued in the management of gun-shot wounds, premising, in the first place, that they are to be, in the main, treated in the same way as contused and lacerated wounds in general. As in other wounds, the first duty of the surgeon may be to arrest a dangerous hemorrhage, either by ligature, compress and bandage, or some of the ordinary expedients to be detailed elsewhere. This having been accomplished, (if indeed there is the necessity,) the next thing to do is to examine the wound, in order to ascertain the track of the ball, the character of the injury, the presence or absence of the ball, or any foreign substance, and the *position* of the ball, if it remains, or of any of the clothing, wadding, &c. The means of making this examination vary according to the depth of the wound, and the course and direction the ball has taken. If possible, the finger alone should be used, though other means will be necessary, if the wound is deep and the course of the ball irregular, from its having glanced. These consist of probes, sounds—either silver or steel—gum-elastic bougies, and catheters. In making this examination, you should first ascertain, if possible, the relative position of the body with respect to the fire-arm that inflicted the injury, whether sitting or standing, &c. Such information may be of great importance in forming your opinion.

If the ball glances, it will sometimes be found to have taken a superficial course. If such is the case, and especially if the injury is of recent occurrence, you can frequently trace its course by a ridge or discoloration, and by following this mark you may often succeed in finding the exact position of the ball, if it still remains in the body.

Having ascertained whether the ball remains or not, and, if it is still in the body, having ascertained its position, it next becomes your duty to extract it, as also any other foreign substance that perchance the wound contains. As the substances contained in the wound may be of various characters, (it being possible that the injury may be caused even by splinters, stones, &c.,) the means of extraction must be modified to suit the peculiarities of each case. If you wish to extract a ball, after having made an examination and ascertained the depth of the wound, you may insert the bullet-forceps, taking care to avoid the structures around, open the blades, and extract gently. Another instrument used is a canula, armed with three elastic claws, which are capable of being protruded, so as to seize and clasp the ball; which is then extracted by carefully withdrawing the instrument. It will sometimes happen that the ball is out of our reach, even when we are aided by an incision. In such cases we are obliged, of course, to let it remain. Fortunately, the ample resources of nature compensate, in a measure, for this evil; for, after suppuration has ceased, a cyst of adventitious deposit is formed around, and, as it were, encases the ball. In some cases, though we cannot reach the ball through its entrance, we can so accurately define its position as to be enabled to extract it through an incision made directly over it. But there are cases in which this procedure would be unjustifiable. For example, suppose the ball to be deeply buried in the muscles of one of the extremities; the trifling inconvenience produced by its presence, would by no means justify the deep incision it would be necessary to make for its removal. It would be far better, in such a case, to rely on the conservative powers of nature to accommodate the parts to the presence of the foreign material. Again; we are unable to extract a ball when it has entered, and abides in, any of the natural cavities. It is, in such cases, entirely beyond our reach. Sometimes a ball may be flattened by striking a bone, and rendered so broad that the forceps are unable to clasp it. In such cases, it is recommended to bore a gimblet or *tire fonde* into the lead, and extract it, after having dilated the orifice.

It will be necessary, sometimes, to remove the spiculæ of bone which may have been broken off by the ball. In doing so we should be very careful, and not exert too much force upon them.

The ball may sometimes lie buried in some of the spongy portions of the bone, and the track by which it entered is lessened in its calibre by the contraction which has taken place. Here the forceps fail in extracting it, and a kind of scoop has been used with success. Sometimes it is best, in these cases, to make a stellated incision over the point, and perforate with the trephine to the requisite depth, being always careful to avoid injuring the joints.

We now come to the consideration of the *general* treatment appropriate to the injury. A vast improvement has taken place, in modern times, in the treatment of all wounds and this is especially the case in the treatment of gun-shot wounds. In the healing processes we look upon *nature* as the great physician: we are content to lend her an assisting hand, but are careful not to thwart her wise operations by our too eager officiousness.

Gun-shot wounds heal only by suppuration and granulation; union by the first intention never takes place. After the extraction of all foreign substances, we use only simple dressing. It has long been the custom to stuff these wounds with lint, and to use a variety of applications. This, as a general rule, is an unwise course. Simple warm or cold water dressing, light and soft poultices, rest, &c., are all that is required in most cases. In a very large proportion of cases, sloughing will take place, and it is only after this has occurred, that the process of granulation can commence. Free exit should be allowed to these sloughs, and whatever else the wound may contain. Some surgeons insist that whatever the nature of the wound may be, it is the first duty of the surgeon to dilate its orifice, in order to prevent it from confining the fluids in the wound, and thus causing the formation of sinuses. Others advise that we should wait till such accumulations take place, and until the mouth of the wound fails to give it an exit, before we resort to the knife. I am inclined to advocate the latter plan. These, then, are the general rules to be observed. When the wound is unduly inflamed, the treatment for the same condition in other contused and lacerated wounds, will apply here.

When the injury to parts is very extensive, the same remarks will also apply as in other cases in which the question of amputation arises, and as regards the constitutional treatment, we need say nothing, except that if it becomes necessary to do so, we should control too great action, and if it be requisite, we should sustain the powers of the system. Thus we see that the treatment is precisely the same as that for other contused and lacerated wounds, with the exception of the modifications specified.

Poisoned Wounds.

We will proceed, in the next place, to make a few remarks on *poisoned wounds.* Such are the stings of spiders; the bites of snakes, hydrophobic, and other venomous animals; the wound from a dissection knife; the glanders from horses, &c.

As regards the *stings of insects*, it is enough to say that they soon *get well*, if they are *not cured.* The sting of the bee is inflicted by means of a horny instrument at its tail, which communicates with a secreting organ elaborating a poison, which, in some constitutions, gives rise to a kind of erysipelatous inflammation. The spider stings by means of its teeth, which are *exceedingly* attenuated.

The snake-bite is inflicted by means of fangs, which, in a state of rest, are partially covered by mucous membrane As regards the snakes of our own country, it is astonishing that, though this is emphatically the land of snakes, there are so few among them that are really venomous. This dangerous property is confined to the rattle-snake, one of the water-snakes, the copper-head, and the calico-snake. Some, generally considered venomous, are not so in reality. For example, the black, short, chubby snake, able to flatten its head and hiss like a goose, is erroneously supposed to be venomous, although of suspicious appearance. So is also the common hog-nose snake. I have myself examined them both, and could discover in neither a poison-fang, or secreting sac.

In the stings from hornets, bees, &c., belonging to the class of hymenoptera, cold and stimulant applications are the best measures to adopt. Laudanum, ammonia, camphor, &c., may be used. If the individual has been attacked by a whole swarm, it will sometimes be necessary to bleed to an extent sufficient to reduce the inflammation. If collapse, however, should be the result of such an assault, it will be necessary to resort to a highly stimulant and anodyne treatment. Ammonia, brandy, &c., should be used internally, and mustard, or some cutaneous stimulant, should be externally applied. As to *snake-bites*, we have an endless variety of *infallibles*, but ninety out of every hundred of these, are *perfectly inert*. It sometimes happens that the life of the victim is so soon destroyed, that nothing at all can be done. Sometimes death comes on in fifteen or twenty minutes. It happens, however, that sometimes the poison is so weak, or so small a quantity has entered the wound, that the case, even if left to nature, will recover. There are certain conditions of the animal, or certain seasons of the year, in which the venom is less poisonous, or even inert; and this is, in a great measure, the cause of the great confidence inspired by some of the innumerable specifics, which have, at various times, been lauded for their efficacy. The first thing in the treatment is, to wash the wound well. Salt will be a good addition to the water with which you do this; or it may be rubbed directly into the wound. You should then apply a cupping glass, directly over the bite; or, if this is not at hand, and nothing else more convenient can be used, you should not hesitate to apply your mouth to the puncture, and endeavor to extract as much of the poison as possible by suction. A common wide-mouthed bottle, heated by means of water, may be applied. An ordinary gourd may be used as an agent of suction with the mouth; or a cane may be applied in the same way. A constriction, to retard the venous circulation, may be resorted to, but it should only be temporarily retained. It is a well known fact in physiology, that in precisely the same ratio as the plethora of the vessels is increased, the process of absorption is retarded; and an excitement of the system will also retard absorption. Let your patient, then, drink brandy, ammonia, camphor, &c. Make him drunk, if it is in your power to do so; and let him drink warm infusions in abundance; for these, being soon absorbed, tend to fill the vessels, and produce a desirable condition of plethora. They also favor the elimination of the poison, by their action on the skin and kidneys. The local after-treatment should be that for a sloughing ulcer; and we should also sustain the powers of the system when they flag. In relation to the heroic doses of arsenic, so commonly used in the East, I must say I have had no experience. The evil resulting from the remedy, I should think, would be as great, if not greater, than that from the bite. The authority, however, is good, and it is a case where the patient should not be deprived of any plausible attempt that might be made in his behalf.

LECTURE XL.

POISONED WOUNDS CONTINUED—WOUNDS FROM RABID ANIMALS—HYDROPHOBIA—TREATMENT—DISSECTION WOUNDS—GLANDERS AND FARCY—WOUNDS OF ARTERIES.

In the instances of poisoned wounds thus far considered, the virus inserted, was a *natural* secretion of the animal. In some other instances, the poisonous agent is a *morbid*, or unnatural secretion. The *hydrophobic* poison is an example of the latter. This gives rise, in the human subject, to a character of disease similar to that under which the animal was suffering at the time the wound was inflicted. The *power of generating* this poison is restricted to the *dog* and the *wolf;* though other animals may become affected with the disease from their bite. A certain elevation of temperature appears to be essential for its production.* Of the nature of the virus we know literally nothing. The Russian supposition, of its origin from certain glands beneath the tongue, is merely a conjecture. We know at any rate, that, whatever it is, it is intimately incorporated with the *saliva* of the animal.

The period in which the poison may lie dormant in the system, or its "period of incubation," has been variously stated by different authorities. Some cases have been related, on good authority, in which an exceedingly long time had elapsed before the peculiar effects were exhibited. Even an interval of twenty years has been reported as the length of the period of incubation in one instance. The duration of this interval then, may be stated as various and indeterminate. It may last a few days, a few months, or indefinitely longer. In the canine species it is shorter, and more determinate; it seems to be under the influence of more stable laws.

Now, in cases of poisoned wounds of this character, all we can do, is to attempt to prevent the action of the virus; for we are compelled to acknowledge, that, once the disease is developed, our art becomes totally unavailable. We may *try* all the multifarious "*specifics;*" but they are sure to fail. Before the signs of the disease are exhibited, is the time for available action: then surgical art may be brought to bear upon the case, with some prospect of effecting good results. We can boast at least of being able to *prevent,* if we cannot *cure* the affection. With this object in view, several expedients may be resorted to. The wound should, in the first place, be carefully washed. But, however important this washing may be, it should not be exclusively relied on: a little of the virus may thus remain, and perchance multiply itself indefinitely. There are three other potent measures, all of which have been resorted to. These are *excision*, the *potential cautery*, and the *actual cautery*. When the parts are punctured and lacerated, you would naturally think it best to excise them; and this would be correct, if we could accurately judge of the exact limits of the wound. This, however, we cannot always do; and we should be exceedingly careful, when we do adopt this plan, to cut clear, and not allow ourselves to be deceived, but be sure that we excise all the contaminated portions of tissue. We restrict the use of the knife, moreover, as a matter of course, to those cases where the incisions would not injure important parts. The wound, after the excision, should be carefully washed; the bleeding should be encouraged; and afterwards it should be treated as any other wound. The *potential cauteries*, I would not place much reliance upon. They are irregular in their action, and unmanageable. If you make use of any of them, you should give a preference to the potassa fusa. It is even better than the nitrate of silver. But neither of these plans are as good as the last mentioned, the *actual cautery*, when it can be used. The iron should be heated white hot, and applied boldly and thoroughly, in order totally to disorganize all the surface to which the virus may have been applied. If the iron be *white* hot, the pain will be comparatively little, from the quick destruction of the sentient surface. If it is less thoroughly heated, the pain is greater, in proportion to the greater length of time occupied in accomplishing the destruction of the tissues. After a while, the destroyed portion will slough off; granulation and suppuration will take place; and the wound will heal by the second intention.

---

*This has been, of late, denied.—Ed.

These means are designed to apply, mainly, to a recent bite; and it often happens, that the *best* opportunity of applying them is lost, from a doubt as to the condition of the animal that inflicted the injury. I would cauterize as soon as I had reason to suppose the animal mad, even if a considerable interval of time had elapsed. It *may happen*, that as yet the influence of the poison is local. Excise then, or cauterize, at *any* time. I may simply state, in general terms, that of all *constitutional* remedies, salivation even included, *none, no, not one*, are to be relied on. Many of these bites are harmless, in consequence of the small quantity of the poison, or some other peculiar circumstance with which we are unacquainted; but we should nevertheless treat the case *as if we expected* the attack of hydrophobia. It is true, that you may read in books or journals, of cures effected by this or that medicine; but if you, unfortunately, have occasion to try any of them, you may expect nothing, *really nothing*, as the result of their boasted efficacy. The scutillaria laterifolia, indiginous to our soil, has recently occupied the newspaper columns for its efficacy in the cure of this disease. Cases *have* occurred, closely similating the disease. These, like the cure, are imaginary, and *such* cases *may* be cured by this, as well as by any other inefficient article.

The effects sometimes resulting from a *dissection wound*, resemble closely a form of diffused erysipelas, as already described to you, and are treated in the same manner as this disease. To ward off these effects, or to prevent the diffusion of the poison, much may be done. The wound should be washed and sucked alternately, and touched with some of the potential cauteries. We are prone to *neglect* these precautionary measures, on account of the difficulty in detecting when the poison is present. Such neglect has sometimes been fatal. I would, therefore, *strenuously* advise you always to adopt the preventive plan I have mentioned.

As regards the diseases peculiar to the horse, and capable of infecting the human subject, the *glanders* and the *farcy*, I can only say, that we cannot stop to consider them at length. Thus far, they have been found incurable. Those about horses so affected, should be careful to prevent any of the animal's secretions from coming in contact with any abraded surface on their persons. The same precautionary measures as already detailed may be adopted, in case such contact is known or presumed to have taken place.

To proceed in the course, we will, in the next place, take up the consideration of

Wounds of the Arteries.

To fully understand the nature of such injuries, it is necessary to be acquainted, not only with the mere anatomical arrangements of these vessels, but also with their intimate structure, and their physical and vital powers. Their internal coat is a serous membrane, which lines not only the arteries, but the internal surface of all the blood-vessels. Its continuity is preserved, between the arteries and the veins, by the intervention of the capillary system, and the cavities of the heart, with the lining membrane of which, it may be said to be *identical.* The second or middle coat of an artery is composed of circular fibres, which are highly elastic, and therefore capable of retracting, after having been extended. This coat was for a long time thought to be of the muscular character, but the advance of anatomical science has proved it to be composed of elastic fibrous tissue, chiefly blended, however, with muscular organic fibre. These two may be considered the *proper* coats of the artery; while the external coat, or *tunica communis*, appertains to both the circular coat, and the cellular tissue around. It is a kind of *sheath* of cellulo-filamentous tissue, in which the artery lies embedded, and by which it is protected, and separated from the surrounding parts.

So much, then, I have deemed it advisable to premise, concerning the *structure* of these vessels. We may now proceed more directly with our subject.

A *wound of an artery* may be more or less important, according to the *calibre of the vessel*, the *extent of the injury*, &c., &c. The wound differs, also, according to its *direction* in relation to the trunk of the vessel. It may be *transverse*; it may be *oblique*; it may be *longitudinal.* It may involve but a portion of the circumference of the artery; it may involve one-quarter, one-third, one-half, three-quarters; or the whole artery may be divided. If longitudinal, it will gape at the contraction of the ventricle, and close more or less with its diastole. If the wound is very limited in extent, say a quarter of an inch long, it may heal like other wounds, as has been evinced by finding the cicatrix; if *oblique*, the gaping will be oblique, the bleeding will be greater, and the healing more difficult; if *transverse*, the gaping will be greater, almost forming a circle, and the injury will be of a much more formidable character. If the wound involves one-half of the vessel, it will be less manageable than if it extended to three-quarters or two-thirds of its calibre. In the latter case, the divided portion becomes folded, as the cellular tissue is less contractile than the coats of the artery. If the vessel is *completely divided*, it undergoes important changes, which aid the stoppage of the hemorrhage; and, as you must understand the processes of nature, before you can understand the plans of surgery, we shall, in the next lecture, take these changes into consideration.

LECTURE XLI.

WOUNDS OF ARTERIES CONTINUED—ARTERIES COMPLETELY DIVIDED—OBLITERATION OF THE VESSEL—COLLATERAL CIRCULATION—TREATMENT OF HEMORRHAGE.

In several varieties of injuries to an artery, it is possible, in some cases, for the wound to close and heal, and for the circulation to go on. This is more especially the case in arteries of a medium size. But when the artery is small, the wound will ultimately lead to the obliteration of a portion of it. We have this morning to treat of those cases, in which the artery has been completely severed. When an artery is thus completely divided in a transverse direction, it will always be found to have retracted longitunally, in a greater or less degree; and generally, also, a narrowing, or contraction at the wounded ends will occur, lessening the calibre of the tube, and thus tending to its obliteration. Both of these circumstances have an important bearing upon the process by which nature endeavors to arrest the hemorrhage. We observe, in the first place, that the orifice of the divided artery is drawn somewhat within its sheath, the structure composing this sheath not being of so contractile a nature. The part of the sheath, therefore, which overhangs the orifice of the artery, interrupts the flow of blood, and thus tends to the production of a coagulum, which gradually encroaches, more and more, upon the calibre of the artery. While this clot is being formed in the wound, external to the vessel, a coagulum also forms within the artery, above and below, or, more correctly, on the cardiac and distal sides of the cut. These two clots extend to some distance within; are of a conical shape; and are continuous at their basis with each other, and with the external clot. This is the second step in the process. The conical clots increase, until they fill up the artery, and thus arrest the hemorrhage. The apices of these cones will extend, respectively, to the first collateral branches above and below the injury; and the whole will form one continuous coagulum, which, as long as it is there, will arrest the hemorrhage.

These, then, are the means by which nature is enabled to stop the flow of blood; but, as every coagulum is liable to become dissolved and liquified, it can only stop the hemorrhage for a time. Hence, this means of arresting the discharge from the vessel is one adopted, as it were, for the emergency, and can have but a temporary bearing. If it were not accompanied by other changes, as soon as liquefaction had taken place the hemorrhage would return. The providence of nature, however, counteracts this dangerous tendency. She does it by setting up an inflammatory action in the part. In proportion as the coagulum is removed, a plastic exudation takes place from the vasa vasorum, and other capillary vessels in the neighboring parts. This exudation takes place both within and without the tube of the vessel. It at first lies in contact with the vessel but, as the clot is removed by absorption, it gradually occupies all the extent of the wound, as also the tube of the vessel. Minute vessels then shoot into its substance, and we soon have an organized plug, as it were, by which the patient is permanently protected from all danger of hemorrhage. But this is not all. As this plasma becomes organized, precisely in the same proportion does the vessel contract upon it; and when we have an opportunity for examining it, we find, that between the woúnd and the first collateral branch above and below, it has become converted into a round cord, and that its cavity has been obliterated. Such are the steps by which nature, unassisted, can permanently arrest hemorrhage, if the wound is not of an immediately fatal character, as it would be in most cases of large wounds to important vessels, unless the danger is warded off by the surgeon. Among some of the lower animals, the danger is not so great—nature being all-sufficient with them, in very many cases, even when the largest vessels are involved. But this is not the case with man. In our own species, we are more apt to find nature failing, when unaided by art.

In the discussion of this subject, we must not limit our observations to the simple incised wounds of arteries. We have seen that a vessel may be *torn* across, giving an example of a contused and lacerated wound. We have already noted that a wound of this character, is far less liable to hemorrhage than a smooth cut. I think I mentioned, that the largest artery of the arm had been torn asunder, without a ligature being required.* It becomes a matter of interest to consider, what are the *causes* which conspire to produce this immunity from the dangers of hemorrhage, in wounds of this character. Why is a lacerated wound less liable to give rise to a serious loss of blood, than a simple incised one? I have mentioned that the artery is composed of three coats, two proper to it, and one common to it and the cellular tissue around. If you separate an artery from the surrounding parts, and subject it gradually to a distending force, sufficiently great to tear its coats asunder, you will find that its internal and middle coats give way much sooner than its external. This fact has an important bearing on the stoppage of the hemorrhage in a lacerated wound. As the two inner coats soon give way, the external one is drawn out; and, since it, after *its* rupture, collapses at its extremity, the former cylinder is converted into a hollow cone, the narrowed apex of which tends materially to impede the flow of blood. The irregular shreds, or flocculi, from the lacerated edges of all the coats, also facilitate the coagulation of the blood, by entangling it and impeding its passage, and in that way assist in putting an end to the bleeding. The process is then continued—by the exudation of blood plasma, as already explained—to the obliteration of a certain portion of the artery.

---

* A case of this kind has recently occurred in this city, in the practice of Dr. Horlbeck, through whose kindness Prof. Geddings was enabled to show the specimen to the class. The whole arm, with the scapula, was torn off by machinery, and no hemorrhage has yet occurred, though six days have elapsed since the accident.—Ed.

There is *another* circumstance, which has an important bearing upon our subject. If you dissect out a portion of the aorta, and apply a degree of force to it, sufficient to rupture the *internal* and *middle*, but not the outer coat, and then lay open the trunk, you will perceive a number of rents and fissures, some occupying the internal membrane only, and others extending through both the inner and middle coats. These fissures run *across* the vessel. Now what must be the consequence of their presence in the *living* subject? A greater or less amount of blood will enter these fissures, and form coagula corresponding in number to the number of fissures. These coagula will gradually augment in size, and protrude into the tube of the vessel, which they finally may occupy entirely, or, at any rate so much encroach upon, as to lessen the flow of blood to so great an extent as materially to assist in the total arrest of the current.

I should also mention, in this connection, yet *another* cause, which may assist in the arrest of hemorrhage. When a vessel is torn asunder, and there is not only laceration, but considerable contusion of the parts, the *vital properties* of the coats of the vessel above and below the injury, in common with those of the surrounding parts, are much impaired in the exercise of the functions peculiar to the different kinds of tissue. If we believe that the vital contraction of the arteries has anything to do with the circulation, we can readily understand, how this cessation of function may, therefore, in some instances tend to arrest the hemorrhage. This, taken into consideration with the other causes I have mentioned, will account for the arrest of the hemorrhage by the hand of nature.

But before I proceed to the treatment of hemorrhage, there is one other circumstance to which I should advert. You have seen that the arrest of the hemorrhage is in most cases followed by the obliteration of that portion of the trunk of the vessel. Now, when the artery is one of the principal ones of the limb, as the femoral, for example, it becomes a matter of importance to understand how the circulation is kept up below the injury. Nature has not neglected to provide for the emergency. A *collateral circulation,* formed by what are called *anastomosing branches,* is ever ready to convey the vital stream to the parts beyond. Every important vessel is provided with these anastomosing branches. They come off from the main trunk above, at acute angles from it, and branch off in various directions. Besides these from above, similar ones are sent up from below, and these two sets of vessels freely inosculate or anastomose with each other. It is by means of these channels that the circulation is carried on after the obliteration of any important vessel. The currents in these anastomosing branches do not continue the same as before the accident to the main trunk, but are somewhat modified in their direction. As soon as the blood is arrested in the main trunk, it sweeps down the anastomosing branches from above, and, meeting with the refluent current in those from below, forces this back and permanently changes its direction, turning it back into the main trunk below the impediment. As there are myriads of these collateral branches, but little inconvenience results from the obliteration of most of the arteries, and the serious consequences which would otherwise accrue from the want of circulation, are by them warded off. The benefits of this arrangement will be especially appreciated, when we come to speak of the treatment of aneurism.

Let us go on, in the next place, to consider what will be our duty, and what are the resources to which we may resort, when we are called on to arrest a hemorrhage from a wound. The nature of the means chosen, will in a great measure depend on the character of the injury. We shall begin with the more simple of these means, and proceed to the more complicated. The first I will call your attention to is *position.* This is a simple, but highly important consideration. It presents *two* means by which the flow of blood is retarded; first, by *elevating the wound,* the gravitation of the liquid column is brought to bear against the current, and thus aids in retarding its flow; and secondly, by *flexing the limb*, and thus changing the current from a direct line, its flow is rendered less easy, on account of the deviation from a right course which it is compelled to make. In these two ways, then, may the position of the limb be made available in the arrest of hemorrhage. From its great efficacy, this means should never be neglected when the character of the wound permits us to modify its relative position to the body. Whenever the wound, for example, is situated on one of the extremities, the limb should be elevated and flexed. In many cases you will find that this simple act will, of itself, nearly, if not completely arrest the flow.

Another means of great importance, and to be classed among the simple methods, is *the application of cold* in some form. The tissues, in common with nearly all forms of matter, contract when deprived of any portion of their caloric. This contraction tends, of course, to lessen the orifice, or orifices, through which the blood escapes. The cold application should be kept up for some time, for when used at intervals, and continued only for a short time at each period, it causes a sort of vascular reaction, which is apt to do more harm than the application has done good. Applied continuously, however, the cold both checks the circulation and favors coagulation. Ice, in a bladder, will be found a convenient and efficacious refrigerator.

Another means of arresting hemorrhage is the use of certain *astringent articles*, in the form, generally, of lotions. There are an infinite number of these. For their peculiar properties, I must refer you to the professor of Materia Medica and Therapeutics. Any of them may be used, except those of too irritating a character.

Another of the simple methods, often sufficient of itself to stop the bleeding, is *compression*. The means for its application are various. In cases of injuries to the scalp, on account of the hard resistance of the cranial bones, this method is so effectual as to render the resort to a ligature very seldom necessary in this region, even in wounds involving the temporal artery. In such cases, the hair should be shaved off, the edges of the wound approximated and a compress and bandage applied. This method is frequently sufficient, also, on the extremities and on many parts of the body, when the principal arteries of the part are not the ones injured. Even in the soft parts, where there is no osseous surface against which to apply the pressure, it will often suffice. It may be applied *directly* to the artery at the wound; it may be applied *indirectly* on the cardiac side of the wound in the vessel; or it may be applied *on both the cardiac and distal sides.* Sometimes a simple bandage is used, and sometimes the wound is filled with a sponge, and a compress and bandage is applied over it. The objection to this is, that it stops the circulation, and therefore cannot be retained, but must, in a short time, be abandoned for other means. Before I mention these other means, I would remark that where the life blood of the patient is fast ebbing away, we must, on the spur of the moment, resort to some temporary means of gaining time. We may, in such cases, resort to the compress and bandage, as just mentioned; we may use a tourniquet if at hand; or upon the emergency, we may employ as a tourniquet, a pocket-handkerchief twisted by means of a stick, as the jockeys manage with their horses, in bleeding them. These, of course, are but *temporary* means, to be resorted to only till more permanent measures may be adopted. But there are also means for keeping up a continued pressure, without injuring the parts materially. Suppose, for example, the femeral artery be injured, and some circumstance prevents us from applying a ligature. In such a case, we resort to what is called an artery-press. By means of this instrument, compression may be used as a *permanent* measure. There are numerous kinds of artery-presses, though they are all constructed on the same principles. Their pressure operates on but a limited portion of the limb, and thus impedes, in but a slight degree, the venous circulation. They consist of a curved spring to encircle the limb without compressing it, two pads placed opposite each other, designed for the points of pressure, and in some cases, a screw, by which the amount of pressure is graduated. The screw works on one of the pads, which is to be applied over the desired artery.

It sometimes happens, that in hemorrhage from a wound on the dorsum or the sole of the foot, we are unable to find the injured vessel. An adequate means of stopping the bleeding, in such a case, is by the aid of splints, applied transversely and opposite each other, the ends being tied together. This method may also be adopted in a wound of the arm, the fore-arm or the leg. Again: in wounds in the palm of the hand, it is sometimes impossible, on account of the strong palmar fascia, to find the bleeding vessel, and if you cannot arrest the hemorrhage in such a case, it becomes necessary to tie the radial artery. I have, under these circumstances, frequently succeeded in stopping the flow of blood, by taking a common globular body, placing it in the palm, closing the fingers firmly upon it, and securing the hand in that position by means of a bandage.

LECTURE XLII.

TREATMENT OF HEMORRHAGE CONTINUED — APPLICATION OF LIGATURES—DIRECT AND INDIRECT METHODS—ANIMAL, METALLIC AND SILK LIGATURES—OTHER METHODS OF ARRESTING HEMORRHAGE—TRANSFIXING THE ARTERY—TORSION—ACTUAL CAUTERY.

In reference to the different methods of arresting hemorrhage, we are now to consider the *application of ligatures* to the vessels, a method more important than any we have yet considered. When we refer to the records of surgery, we find that in a former era of our science, so great was the dread of hemorrhage, that it often deterred the surgeon from the performance of what are now considered even trivial operations. Yet, at the same time, we are surprised to see that the application of ligatures was understood by them even as early as the time of Paulus Ægineta; and notwithstanding this, the surgeons of that period and later, were in the habit of relying, when they did operate, upon the actual cautery. In accordance with this plan, it was gravely proposed to use for the performance of operations, a *red-hot knife*, or one dipped in some strong acid.

In modern times, notwithstanding we have many other resorts—some of which we have already mentioned—for the command of hemorrhage, the application of a ligature is that which deserves our greatest confidence. Ambrose Paré was the originator of that plan, which, improved upon by others, now enables us to perform the most important operation, without any apprehension concerning the loss of blood.

As regards the different kinds of ligature, with reference to their mode of application, we speak of the *direct* and the *indirect* ligature. By a direct ligature we mean that method of ligation in which the artery is exposed and isolated, and the ligature is applied *directly* to the vessel itself. But you will sometimes meet with circumstances in which you cannot isolate the artery; or in which the condition of the vessel is so changed by disease, as to render it inadvisable, sometimes in fact, unsafe, to apply the ligature directly to it. Ossification in the coats of the artery, for example, would make the application of a ligature directly to it, an unsafe operation. Under such circumstances, it would be best to include in the ligature some portion of the surrounding tissues, taking care to avoid the nerves and veins. This method of ligation is what is called the *indirect ligature*. We very frequently find it necessary to resort to this plan in cases of persons of advanced age, in which class the arteries are more apt to be found in that condition denominated *ossification*. We must, in their case, include some substance less brittle, and more yielding, than the coats of their arteries. In some oblique, and in some gun-shot wounds, we are also obliged to use the indirect ligature.

Again; having reference to the material employed, we speak of *animal*, *silk*, and *metallic* ligatures. Animal ligatures are made of various substances; ordinary cat-gut, chamois leather, the tendons of various animals, &c., have all been employed. In strict language, silk ligatures should be included in the same class as animal ligature; but for convenience we exclude them, and include in this class only such as are capable of being taken up by absorption, and thus exert a pressure on the vessel for a limited time only.

Although the credit of first using the animal ligature has been claimed by modern science, I may here state, that even in the time of Ambrose Paré, the leather ligature was not unknown. The only kinds of leather now used are soft doe-skin, chamois leather, and French kid. These animal ligatures do not, like silk, act as foreign bodies; and therefore, when using them, we are not obliged to leave one end out, but can cut both off close to the knot, and leave the loop to be absorbed. This very circumstance, however, constitutes an objection to their employment in the ligation of the larger vessels, as the ligature is apt to be absorbed *before the adhesion of the inner walls of the vessel has taken place*, which would allow of a secondary hemorrhage, in some instances, exceedingly troublesome to manage. But when the vessels are small, as their obliteration takes place more speedily, and the force of the circulation is not so great, you will find the use of animal ligatures very advantageous. The knot and loop being the only parts left in the wound, and the material being capable of being taken up by the absorbents, without producing the irritation of a foreign body, there is nothing to prevent the incision from healing by the first intention. This is, to be sure, a great advantage gained; but when you have to tie one of the large trunks, I would advise you by no means to rely upon an animal ligature.

As regards the *metallic* ligatures, which consist of fine metallic wire, it will be sufficient for me to say, that although they may produce less irritation than the ordinary silk ligatures, I cannot see that they possess any advantage over them. They, too, act as foreign bodies, and prevent the union of the wound, until they are thrown off, or extracted. I infinitely prefer the silk, as they are more manageable; and therefore only allude to these metallic ligatures because you will see them mentioned in the books.

There exists a difference among surgeons, in regard to the *shape* of the silk ligatures. Some prefer a *flat* thread, some a *round* one. Concerning this difference, we must enter somewhat into details. If the ligature be *small*, and equal force be exerted on it, whether it be round or flat, the same effect will be produced; but, if it is large, there may be considerable difference in the results. In reference to these results, I should mention, that, while some surgeons (Jones more especially,) have deemed it necessary to apply the ligature with sufficient force, and in such a manner, as to cut through the internal and middle, and leave only the external coat, others consider this result as highly deleterious, avowing that it is apt to lead to sloughing of the vessel. So much was this feared, that some of the English surgeons, and also the distinguished Scarpa, advised that, in order to *prevent* the division of the inner and middle coats, a small compress should be applied between the ligature and the vessel, and that the ligature should be allowed to remain only a sufficient time to secure the commencement of the uniting process, when it, together with the compress, should be removed by passing a very small knife into the wound, and cutting the ligature from the artery. Notwithstanding the high authority in its favor, this plan has failed to receive the sanction of modern surgery, as the fears which seemed to call for its adoption are now considered unfounded.

It was at one time proposed to make use only of temporary ligatures. The proposition was based on experiments instituted on the lower animals. However valuable such experiments may be, we should always be extremely cautious how we apply their results to our practice on the human subject. It has been noted that even the caroted of a dog has been divided, and the hemorrhage ceased spontaneously before the life of the animal was destroyed. I repeat, therefore, that we should be cautious how we refer to the human subject, results which have been obtained from experiments instituted upon the lower animals; for although a temporary ligature may be sufficient for a dog, it is no reason that it should be relied on for a human being. Obliteration of the vessel will often fail to take place, and, therefore, secondary hemorrhage is but too apt to occur. I beg, then, to be understood to affirm, that whenever a ligature is required, it should be applied, with a few exceptions, directly to the artery, and be allowed there to remain, until it becomes detached of itself. I allow that there may be some exceptions to this rule; for where the ligature remains for weeks, or months, there can then be no danger in removing it, as obliteration must by that time have taken place. It should remain, however, until we are perfectly satisfied that this obliteration *has* taken place. We leave out one end of the ligature as I have already stated. If we cut off both ends, and relied solely on the gradual absorption, or destruction of the remaining portion, we would find that it would keep up an incessant and protracted irritation; but if we leave one end, and let it come out through the orifice of the wound, after the lapse of from seven to ten days we may, at every dressing exercise, by its means, a slight degree of traction on the knot, until we discover that it has become detached, when it can be totally withdrawn; after which the wound will rapidly progress towards a cure.

The *size* of the ligature should be adapted to the size of the vessel to be tied. For an artery of medium size, a single thread of strong twist is sufficient. The ordinary saddler's twist is the best for the purpose, and is capable, if of good quality, of controlling even a large artery. But as this is sometimes not very sound or strong, it is advisable, where the vessel is large, to double it two, three, or even four times, and to wax it well, in order to prevent its displacement, or its slipping at the first tie.

You may read of the *surgeon's knot.* It is the same as the common knot, with the exception that the thread, in forming the first tie, is passed through twice, instead of once. I prefer the common knot to it, as in a deep wound it is inconvenient of adjustment, and moreover, possesses in no case any material advantage over the ordinary method of tying.

As a general rule, where an artery is divided and its ligation is rendered necessary, if the wound is a fresh one, and it is possible to do so, the ligature should be applied at the wound; and I should here remark, that we sometimes are obliged, on account of the collateral circulation, to apply two ligatures in order to arrest the hemorrhage; one for the cardiac, and one for the distal side of the division or wound of the artery. This will be found to be more especially necessary in those injuries occurring about the joints, where the collateral system of circulation is more perfect; as near the elbow, or the knee. But, as I have intimated, it sometimes happens that we *cannot* apply the ligature at the wound, and yet a ligature is required to arrest the hemorrhage. In such cases, the artery must be ligated higher up, or at some point in its course on the cardiac side of the injury. Suppose, for example, a deep penetrating wound to have been inflicted in the calf of the leg, and that hemorrhage from the posterior tibial artery is the result. Here, unless we make a very deep, extensive, and painful cut, we cannot take up the artery at the seat of injury. It would be much the best plan, under such circumstances, to tie the femoral artery. Such has been my plan in such injuries; and I would advise, that in nearly all cases of hemorrhage from the posterior tibial artery in the upper third of the leg, which require ligatures, they should be applied to the femoral.

Such, then, gentlemen, is the purport of the remarks I proposed to make on the arrest of hemorrhage. There is, however, one expedient, somewhat allied to the ligature, which I will mention, but which I cannot recommend. Arming a needle with a thong of buckskin, you transfix the vessel, and draw the thong into it. It arrests the hemorrhage, and causes the obliteration of the tube of the artery in the same manner as the ligature does. And again: besides the ligature, and those means already mentioned, we have a method of arresting hemorrhage known as *torsion*. This has also been claimed as a modern invention, although it was known even as early as the time of Galen. There are many cases in which this torsion will be found highly available, especially where the smaller vessels are the ones involved. Having sponged the wound, you seize the end of the artery with a pair of forceps, and draw it out as far as possible. You then apply another pair of forceps transversely, at a little distance up the artery, and, holding it fast at that point, twist it several times round with the first pair. I should warn you, that while this plan may answer very well in *small* vessels, you should never adopt it when the larger arteries are concerned.

Another very important method of arresting hemorrhage is the *actual cautery*. It is particularly useful in deep wounds, in wounds about the mouth or nose, and in the bony cavities; and in cases where there is ossification of the arteries, it is also applied with advantage. The spot should be sponged, and then be thoroughly cauterized by the application of a cautery brought to a *white* heat. Obliteration takes place by the time the slough comes off. Such, then, is a general outline of the means we resort to for the arrest of hemorrhage. At our next meeting we will proceed to another subject.

LECTURE XLIII.

ANEURISM—TRUE AND FALSE ANEURISM—CONSECUTIVE FALSE ANEURISM—FALSE INTERNAL ANEURISM—FALSE EXTERNAL ANEURISM—SPONTANEOUS AND TRAUMATIC ANEURISM—CIRCUMSCRIBED AND DIFFUSED ANEURISM—PRIMARY AND SECONDARY DIFFUSED ANEURISM—DISSECTING ANEURISM—FUSIFORM, SACCIFORM, CYLINDROID, AND CIRSOID ANEURISM—ARTERIO-VENOUS ANEURISM—ANEURISM BY ANASTOMOSIS, OR NÆVI MATERNI, OR TELANGIEKTASIS—CAUSES OF ANEURISM.

I propose this morning, gentlemen, to take up the consideration of the particular disease called ***aneurism.*** By this term we mean, a *pulsating tumor, communicating with an artery, and containing blood.*

When we consider this subject in all its details, we find it necessary, in order to thoroughly understand its nature, to divide it into several varieties. In the first place, with reference to the coats of the vessel involved, we divide it into *true* and *false* aneurism. Let us see in what respects these differ. In that pathological condition denominated *true* aneurism, we have a dilatation of all the coats of the artery. Now, suppose the aneurism to be a spindle shaped tumor, the walls of which are composed of *all* the dilated coats of the vessel: this dilatation will constitute the aneurism, and it will be of the *true* kind. But we have said that the artery is divided into three coats. Now, suppose that in a tumor constituted as already described, the two internal coats should be ruptured, or destroyed by ulceration, and that the dilated outer coat forms the wall of the aneurism: such a pathological condition would be denominated a *false* aneurism. You perceive, then, that the disease may undergo various modifications. During the first stages, all of the coats may be distended; but as the distention increases, the two inner coats may give way, and what was at first a *true* becomes a *false* aneurism. This is called a *consecutive* false aneurism: and there is yet another variety of this kind, which, though denied by some pathologists, is recognized by others. This variety consists in a rupture of the external, and sometimes of the middle, with expansion of the inner coat, and is denominated *internal* false aneurism, in contradistinction to the other, which is *external* false aneurism. Here we have a portion of the internal, or the internal with the middle coat, forming a kind of hernial sac, as it were. In some rare cases of *traumatic* aneurism this may take place, thus producing a species of hernia of the blood-vessel.

Again: we may divide the subject into *spontaneous* and *traumatic* aneurism. *Spontaneous* aneurism is that which results from certain changes going on slowly in the coats of the vessel, and giving rise ultimately to a breach in their continuity. *Traumatic* aneurism results from a sudden breach of continuity, as from a wound.

We have, again, the *circumscribed*, and the *diffused* aneurism; the first with a definite wall formed by one or more of the coats of the artery; the second with all of the coats divided, and the blood diffused into the surrounding parts. In the latter case, the walls of the tumor are not formed by any of the coats of the vessel, but by the textures into which the blood is extravasated. Thus, when the femoral artery is wounded, the blood is thrown out among the muscles of the leg, and forms a tumor, which, when opened, is found to contain a quantity of blood. This, then, is a *diffused* aneurism; and where it is caused by a wound, it is called a *traumatic diffused* aneurism. Diffused aneurism may be *primitive* or *secondary*; primitive when it is caused by a wound; secondary when it is the result of the rupture of a circumscribed aneurism.

Again: it sometimes happens, that in the *large vessels*, the blood dissects its way between the coats of the artery, and again returns to the trunk of the vessel. The current of blood is thus divided into two channels. Such a condition is sometimes found at the arch of the aorta. The division seems to occur more frequently between the middle and external coat, than between the middle and internal. To this condition we apply the appellation of *dissecting* aneurism. It is true, it is one of rare occurrence; but it is nevertheless of great importance. I hold in my hand the specimen of a case, which was of a remarkable character; and which, as far as I know, is a new one in the records of pathology. It is the specimen of a dissecting aneurism, with its sac in the wall of the ventricle itself, and in which, too, the course of the blood was retrograde. It is a specimen of a peculiar and unique character.

Again; for the sake of perspicuity of discussion, we divide aneurism according to the *shape of the tumor.* We find some assuming the form of a spindle; and to such we apply the term *fusiform.* That variety which takes on the form of a bulging sac on one side of the artery, we call *sacciform.* It is frequently observed, in the main trunks that the dilatation takes place equally on all sides of the vessel, augmenting, to a greater or less extent, the diameter of that portion of the same. This may be denominated a *cylindroid* aneurism. We find sometimes, especially in the extremities, that not only the artery, but some of its branches become dilated, the whole assuming a knotted appearance, afterwards similating closely the condition presented by varicose veins. In consequence of this knotted appearance, we call such a case of *cirsoid* or *varicose* aneurism.

We have another variety of aneurism, from wounds in which a vein is involved. Such cases sometimes result from a careless or ignorant performance of the operation of venesection. Various names have been applied to this division. Some designate the class as *varicose* aneurism. But I would prefer that this term should be used only in reference to cirsoid aneurism, and think it best to call the class under present consideration, *arterio-venous* aneurisms. Now, suppose a lancet driven through the vein at the bend of the arm, and into the artery; at every impulse of the heart a portion of the arterial blood is driven along the tube of the vessel, and a portion is driven through the orifice into the vein; where, meeting with the venous current, it is impelled against the walls of that vessel, and gives rise to an inordinate distention of those walls. This goes on increasing, until the distress is so great, as to call for an operation to relieve the patient. The distention may continue high up the arm, in the course of the vein. But there is also another variety of this arterio-venous aneurism. Supposing the injury to have taken place as already stated, we find that, under certain circumstances, while one portion of the blood continues in its natural course, and another passes into the vein, still a third portion becomes infiltrated into the textures between the artery and vein; and we have, not only a distention of the venous coats, but also a saccular aneurism, lifting the vein, and dissecting between it and the artery. These then are what we denominate arterio-venous aneurisms.

There is yet another variety of aneurism, of which I should speak. When we direct our attention to the extremities of the arteries and the radicles of the veins, we not unfrequently find an inordinate dilatation of these vessels, forming a tumor which is found to contain blood. This condition was called by John Bell, *aneurism by anastomosis*. Nævi maturni are of this character. These minute vessels being not only increased in diameter, but also in length, they sometimes grow to tumors, and sometimes remain mere elevations from the surface. This is the *telangiektasis* of Baron Græfe, a dilatation of the ends of the vessels.

These then are the chief varieties of aneurism to which I deem it necessary to direct your attention.

It is now my duty to bring to your notice the consideration of the *causation of aneurism*. This division of our subject will not detain us long. As regards *traumatic* aneurism, it is sufficient for me to remark, that any wound penetrating an artery, and not resulting in immediate death, may be sufficient for its production. But the subject of spontaneous aneurism is a different one. The causes are more obscure, and therefore their consideration is of greater importance. To elucidate the subject, it is requisite that we should take into account all the pathological conditions which tend to impair the different structures of the vessels. There is one circumstance, to which I desire, in the first place, to call your attention. It is this: in the progress of life,—that is after its meridian—the arterial system appears first of all to exhibit an impairment of its structure from the wear and tear of continual action. The changes thus induced, predispose to the production of the disease under consideration. In the aorta of an old subject, though there may have been no symptoms of disease, you will frequently be enabled to discover some portion of the artery exhibiting a change of structure, by which the elasticity of the particular part is either considerably impaired or totally extinct. Now, this change is preliminary to the development of this species of aneurism. You will find, if you consult the work of the celebrated Scarpa, that he denied that there could be any such thing as a *true aneurism*. But, if such be the case, what term shall we apply to the form of disease we have so denominated; that form, in which there is merely a gradually increased condition of simple dilatation of all the coats of an artery, and in which there appears to be no change except in the diameter of the vessel, which is increased to a certain degree, and then, by the formation of layer after layer of coagula, is perhaps restored, and even lessened in some cases? What, too, must we call those cases, which partake of the nature of the above, in being merely a dilatation of all the coats, but are sacciform in appearance? But to return to the *causation* of aneurisms. Some say that they owe their origin merely to the wear and tear of vital action; and some, with more plausibility, affirm that they are caused from changes induced by a process of inflammation, gradually going on, and resulting in the deposit of abnormal matters. To enter into a minute discussion of all the details involved in the consideration of this subject, would require more time than is at our disposal; but if you open into the aorta of an old subject, you will very frequently find, disseminated through the inner coat of the vessel, a number of minute granular masses, deposited throughout the membrane. These appear, in the first instance, only to affect the inner coat, the peculiar structure of which they totally destroy, and ultimately to extend their ravages to the fibrous coat, the nature of which they also greatly impair, or even destroy, in like manner as the first. For want of a better name, these materials have been called *atheromatous deposits*. They form the nidus for the deposition of the phosphates or carbonates of lime, which give rise to that condition which authors have erroneously denominated "ossification" of the artery. Its structure, in such cases, does not in any manner resemble that of the bony system. Now, when a solution of continuity in the inner coat of an artery is thus effected, the fluid blood, coming in contact with the abnormally roughened surface, coagulates, and in a measure impedes the circulation of the current coming from the heart. This, being thus obstructed, is forced against the diseased sides of the artery; and the blood gradually insinuates itself into its structure, encroaches upon the surrounding substances, and forms, if it penetrate also through the middle coat, that preternatural distension of the outer layer of the vessel, which we have denominated *false* aneurism, sacciform or otherwise.

This, then, is doubtless the manner in which aneurism is frequently produced. We will continue the subject at our next meeting.

LECTURE XLIV.

PATHOLOGY OF ANEURISM CONTINUED—TERMINATIONS OF ANEURISM—TREATMENT, MEDICAL AND SURGICAL—PRESSURE—GALVANO- OR ELECTRO-PUNCTURE—ACUPUNCTURE—LIGATION.

Having, at our last meeting, described the first processes in the pathology of aneurism, we propose to continue the subject, by following the changes induced by these processes to their tendencies and terminations.

You can very well understand, that if an aneurism be left to itself, it will tend to a gradual increase in size, a gradual attenuation of its walls, and, subsequently, to a destruction of those walls by rupture or ulceration, or both, and an escape of the blood from the sac. This may be considered the general result; and hence we affirm, that the usual tendency of an aneurismal tumor is to *death*. There is a difference, however, in the *manner* of this termination, according to the *position* of the disease. If, for example, the aneurism is situated upon one of the extremities, it will tend towards the external surface, and the hemorrhage will occur through that medium. When it has arrived at a position immediately under the skin, its distended walls will give way; the skin is then gradually attenuated by absorption, and the patient destroyed by a sudden gush of blood. If, on the other hand, the affection is situated more centrally, it may tend to a rupture into some of the cavities, or internal organs, and the production of death by hemorrhage in *that* direction. Such may be the termination, when the aneurism is situated on the aorta, the carotid, &c.; and it is especially apt to be the case, in aneurism of the *arch* of the aorta. The discharge may take place through the bronchii, or the trachea, or into the æsophagus. If the abdominal aorta is the one affected, the hemorrhage may occur into the stomach, intestines, peritoneal cavity, &c. I would also remark, that in aneurism of the abdominal aorta, where the vessel passes in contact with the vertebral column, the pressure may cause a considerable absorption of the same; so much so, indeed as sometimes to expose the spinal canal. One case is on record, in the "Lancet," in which the discharge actually occurred into that cavity; and I myself have known a case, in which nearly the whole thickness of the vertebral column, with several of the ribs, was removed by absorption.

Although such is, generally speaking, the termination of an aneurismal tumor of large size, there are some cases which result more favorably: they, however, are the exceptions. We sometimes find that an aneurism, after attaining a certain size, begins gradually to diminish, in consequence of agencies presently to be described. Its walls become more and more firm; the column of blood becomes smaller and smaller; and finally the circulation through that part of the diseased vessel is arrested, and a spontaneous cure is thus effected.

You will remember, that in speaking the other day of the different forms of aneurism, I stated that the sac was frequently lined with concentric layers of coagula, forming on the inner wall of the said sac. Now, it may happen, that, by the successive depositions of this coagulated fibrine, the current through the diseased artery is so impeded as to throw the force of the circulation more or less into the collateral branches. These will, in such a case, be gradually enlarged, to meet the exigencies of the occasion; and this enlargment will keep pace with the gradually increasing obstruction, presented by the successive formation of coagula on the walls of the tumor. As the force of the circulation is diverted from the aneurism, the coagula are formed with proportionately increasing facility; until, in time, they entirely fill up the tumor, and effectually plug up the diseased artery; which, of course, no longer performs the function of a blood-vessel, but is converted into a fibrous cord. Thus, the spontaneous cure of the aneurismal tumor, in such a case, consists in the obliteration of its cavity, and that of the vessel on which it is situated. If you examine an old aneurismal sac, it will present the appearance of a mass of coagula. If the case is a recent one, those layers next to the inner wall of the sac will be found so firm as to resemble more an organized structure, than merely a layer of coagulated fibrine. The absorption of the more fluid portions has *there* begun to take place, which, if the disease had been seen at a later period, would have been found to have occurred throughout the whole mass, and to have reduced the swelling to one-half, one-third, or even one-fourth of its original size. Plasma appears to have been thrown out, in many instances, and to have endowed the part with a certain degree of organization. It is sometimes found that absorption has been so active, that the only vestige of the disease is a hard, fibrous cord, in the position of the former vessel. I have seen many cases of these spontaneous cures of aneurisms. Where the sac remains large, a yellow, wax-like deposit is often found. It is called a "*sebaceous* deposit," and is merely the remains of the coagulated fibrine.

But while thus a spontaneous cure can take place, and may even be materially assisted by the surgical art, yet this fortunate result can be regarded only as a favorable exception to a general rule. Where, however, an aneurism exists in an internal and inaccessible part of the body, it is a comfort to know, that at any rate we can do something, either to aid nature in effecting a cure, or to *prolong* the life of the patient, by endeavoring to prevent, as long as possible, a rupture of the sac. But of this we will speak more particularly hereafter.

The *treatment* of aneurism may, in a general manner, be divided into the *medical* and the *surgical treatment*. Of the *medical* treatment, I shall not speak here, as it will come in more appropriately at the close of the subject, when we consider the treatment of internal aneurism. As regards the *surgical* treatment, you must bear in mind, that, however various the different plans may be, they all have in view this one indication—to divert the circulation from the diseased portion of the artery, and thus to cause the obliteration of the vessel at the seat of the affection. This is the leading indication to be fulfilled. The means employed are various. Whatever will tend to impede, or to stop the circulation through the diseased artery, will tend to its obliteration, and, therefore, should be considered a *means of cure*. One of the most simple of these is *pressure*. As pressure was known by the ancients to obstruct the circulation, it was by them applied to the cure of aneurism. But, owing to their manner of applying it, they failed to derive much benefit from its employment. In considering the method of treating aneurism by *pressure*, we will treat of it, in the first place, as applied directly to the aneurism; in the second place, as applied to the artery on the cardiac side of the tumor; and in the third place, as applied to the artery on both sides of the aneurismal sac.

As to the first method, I would remark that pressure thus applied would do more harm than good, except where the tumor is very small, and is directly over a bony surface. In all other cases, such a plan of treatment would be decidedly objectionable. Let us see on what the objection would be founded. We have seen that aneurism, in many cases, results from a diseased condition of the coats of the artery at the seat of the tumor, and is generally accompanied by a diseased condition, also, of the soft parts around. Now, if under these circumstances we apply pressure directly to the aneurismal sac, since the vital powers of the part destined to receive the pressure are already much enfeebled, that pressure will be but too apt to lead to sloughing of the parts compressed, and will thus tend to hasten the fatal results. In most cases of aneurism, then, and especially in cases of arterio-venous aneurism, the direct application of pressure is improper. We now come to consider the second method, or pressure on the cardiac side, as applied to the artery. Every principle of sound surgery will support the adoption of this method: as, for example, in popliteal aneurism, to compress the femoral artery. Pressure thus applied must inevitably tend to obstruct the circulation through the aneurismal sac, and to divert its current into the collateral branches. But when we come to consider the *means of applying* this pressure, we find that there is one circumstance of great importance, as influencing materially the success of the method. In former times, the pressure was applied at *one point* only, and it was found that this constant compression would, if continued long enough to be of any benefit to the aneurism, be almost certain to cause a greater or less degree of ulceration and sloughing at that point. To avoid these consequences, modern surgeons have proposed and adopted the plan of applying the pressure at *various points*, either simultaneously or consecutively. This important modification has been productive of very favorable results, and has repeatedly been the cause of success, where other methods of treatment by compression have failed. I would advise, therefore, that when you desire to treat an aneurism by pressure, you should either provide yourself with a number of artery presses, and apply them at different points in the course of the artery, or apply one consecutively at the most eligible positions, removing it as soon as evidences of inflammation begin to be developed. But I have stated that the pressure may be applied to the vessel, both on the cardiac and distal sides of the tumor. In some cases it may be advisable to adopt this method. The distal pressure may be of benefit in two ways. In the first place, it may prevent a retrogade current into the sac, through the collateral branches, which unite again with the main trunk beyond the disease. This retrogade current may be of sufficient volume, even to distend the sac as before, and thus prevent the coagulation of its contained blood, and thwart our efforts for a cure. This is one reason, then, for the application of compression on the distal side. But there is another. We know that it is a law of physics, that blood, when kept quiet, will coagulate. As it is our object to obtain this coagulation of the blood, any means which ensures that favorable stasis of the fluid, is a material assistance. The pressure on the distal side of the aneurism, by stopping the passage of any blood which may have escaped from the pressure above, secures this desirable condition, and places the blood in the sac under the most favorable circumstances for the process of coagulation. But notwithstanding what I have said, and notwithstanding a number of cases reported of the successful treatment of aneurism by pressure, as I have explained, yet it will often—yes, in the majority of cases—fail in effecting a cure.

Let us see, then, what are the other resources which have been brought to bear in its treatment. One of these is the plan of *electro- or galvano-puncture.* You take a long, attenuated, acupuncture needle, and, having transfixed the tumor with it, you apply the wires of a galvanic battery to its ends, and thus pass a current of electricity through it, which is *said* to produce a coagulation of the contained blood. I would not advise the adoption of this method. Nor would I have you place much reliance on the plan of intercepting the course of the blood, by passing threads in various directions through the aneurismal tumor.

We go on, then, to the consideration of a far more certain resort. I allude, as you may anticipate, to the *ligation of the artery affected.*

Where no untoward circumstance arises, the cure of an aneurism, after the application of a ligature, may be regarded as certain. In former times, when an artery was to be ligated for the arrest of *hemorrhage,* two ligatures were applied to the exposed vessel, and the artery was cut between them. This, I repeat, was for the cure of hemorrhage. In the treatment of aneurism, they adopted a different plan. There were two ligatures applied; and, in the method of Antyllus, one was placed on the cardiac, and one on the distal sides of the tumor. There was some difference, however, in the application of these ligatures. Some cut down to the vessel above and below the disease, and there applied their ligatures, afterwards cutting down to the sac, and turning out its contents. But by far the most common method was, after pressing above, to cut through the sac itself, and apply the ligatures to the vessel at each end. This latter was the method of Antyllus; and it was in general adoption up to the time of John Hunter; who presented a modification of it, which has received the sanction of modern surgery. Let us now consider what are the objections to the method of Antyllus. We have seen, that in a case of aneurism the coats of the vessel are in a diseased condition, and that this abnormal state may extend some distance on each side of the tumor. Now, if under these circumstances, we cut to and tie the artery at a diseased point, we run the imminent risk of secondary hemorrhage, from sloughing of the unhealthy tissues included in the ligature. By Hunter's method, we are enabled to obviate the necessity of running such a risk; and in pursuing this subject, we will find that humanity is much indebted to the researches of the restless genius of this celebrated surgeon. The present method of ligating an artery for aneurism, is founded upon the principle, that the farther from the disease, the sounder are the coats of the vessel, and, therefore, the more capable of bearing the application of the ligature. Hence, it is recommended to cut down to the vessel some distance above the aneurism, and to depend on the collateral circulation for the supply of the parts beyond the point of ligation. As an illustration I may mention, that in *popliteal* aneurism we tie the *femoral* artery, with almost invariable success. This has been a great improvement in our science, for which we are vastly indebted to the great originator of the change.

But here an important question presents itself:—Have we not some cases, in which the application of a ligature on the cardiac side of the tumor is impossible? We have. What then are we to do under such circumstances? Are we to do nothing, and leave the patient to his fate? Many years ago it was proposed, that when it was impossible to apply a ligature on the cardiac side, we should cut down to the artery on the distal side, and there apply it. It was proposed by Brasdor; but failing in every case, when first applied to practice, it was given up. It has since been revived; and, though failure in its employment is the *rule*, yet, as exceptions, there are cases of success, and it therefore demands our attention, as some cases may be adapted to its employment. Suppose you have an aneurism of the carotid, too low to admit of a ligature on its cardiac side. You would here be perfectly justifiable in applying a ligature on the distal side of the tumor, and in thus striving, by checking the circulation, to obliterate the vessel, and cure the disease. The large subclavian may turn off the current, and the collateral circulation will be carried on by the vertebrals, &c., with sufficient activity to sustain life. I say then, in such a case your patient is entitled to the chance of prolonging his life which is thus offered.

Such then, gentlemen, are the methods we resort to for the cure, or for the relief of aneurism. You will see, that of all the expedients resorted to, the ligature is the main reliance. This, of course, must be modified to suit each case. To-day I have merely touched upon the general principles involved: to-morrow I shall take up the consideration of the operative proceedings for the application of ligatures, both for aneurism, and for hemorrhage.

LECTURE XLV.

LIGATION OF ARTERIES — LIGATION OF COMMON CAROTID ARTERY — OF ARTERIA INNOMINATA.

We design this morning, gentlemen, to begin the consideration of the applications of ligatures to the principal arteries.

There is no branch of surgery in which the operator assumes a greater degree of responsibility, than in that to which I would now call your attention. A single mistake in anatomical knowledge, a single slip of the knife, may involve the life of his patient. As any one of you may be placed in a position involving such a responsibility, I cannot too strongly impress upon you, as a most sacred duty, the obligation you are under, of *thoroughly preparing* yourselves for its assumption. What is your duty under such circumstances? It is—thoroughly to acquaint yourself with the *anatomy* of the vessel, which you are about to tie; thoroughly to understand its situation, its relations to surrounding parts, and the location of the important structures which you may injure in the operation. When you are thus qualified, you will be prepared to undertake any of these operations; but, until you do gain such a knowledge, let me urge upon you in strong terms, never to undertake the ligation of any large artery.

Having premised thus far, I will now go on, and point out to you the methods of applying ligatures to the principal arteries. We will commence with the arteries of the neck. The course and particular relations of these vessels have been already accurately pointed out to you by my colleague; and, commencing with the *common carotid*, I will only, therefore, give its general surgical relations. As it comes from the chest, it lies immediately behind the sterno-mastoid muscle. It continues up by the side of the trachea; and when it arrives on a level with the thyroid cartilage, it divides into the internal and the external carotids. Following the *external* a little above this point, we find that it soon glides beneath the digastric muscle, below which, it, and the upper portion of the common trunk, are uncovered by any muscle except the platisma myoides.

As the *common* carotid ascends, it is crossed about the middle of the neck, by the omo-hyoid muscle. From the point of its emergence from the muscle, it is no longer covered by the sterno-mastoid, but proceeds along its inner margin. This omo-hyoid muscle forms the upper border of the "inferior triangular space," or "omo-tracheal triangle," and the lower border of the "superior triangular space." The *inferior* border of the former is formed by the clavicle, and its *inner* border by the trachea. The other two sides of the latter, or *superior triangular space*, are the digastric muscle above, and the sterno-mastoid externally. I mention this peculiar arrangement of the parts, because it is in one or the other of these triangles, that the vessel is to be tied—that is, either above or below the omo-hyoid muscle.

There are still some other anatomical considerations, of greater or less importance, for you to bear in mind. Directly in front of the vessel, and included even in its sheath, is the descendens noni nerve. Unless you are careful to draw this nerve outward, you may include it in the ligature. Closely connected with the artery, on its external side, lies the great *internal jugular vein*. If, therefore, you are not careful in making your incision, you may divide this vessel; an accident, not so important from the hemorrhage as it might be from the sudden ingress of air, which would greatly endanger the life of the patient. Remember, then, that the vein is on the *outside* of the artery. Its position is somewhat different on the two sides, as it descends to enter the chest. On the *right* side, it inclines *from* the artery; on the *left*, *towards* it; and hence, in the latter case, it will be found more in the way of the operator. Again; directly between the vein and artery, but in the posterior part of the sheath, is the pneumo-gastric nerve. As this nerve presides entirely over the function of respiration, you may imagine what a serious matter it would be to include it in a ligature. You must, then, bear in mind its position behind the artery, and pass the instrument close to the vessel, in order to avoid such a serious mishap. Directly behind the artery, but at a greater depth, we have also the trunk of the great sympathetic nerve. If the instrument be passed *too deep*, it may be taken up, and this gives rise to great inconvenience and distress. In the lower portion of the course of the common carotid, we have also the *recurrent nerve*, running up on its inner side, and the *inferior thyroid artery*, crossing it behind. They have to be avoided in the operation. There are other relations, which, however, I do not consider of sufficient importance to occupy our limited time, particularly as they may all be found laid down in your works on anatomy, and as the professor of that branch has already detailed them to you, in his own peculiarly interesting manner.

In performing the operation of ligating the common carotid artery, whenever you have it in your power to select, I would advise you to choose the space *above* the omo-hyoid muscle for the application of the ligature. Should you determine to operate on this portion of the vessel, you should place your patient on his back, with his head thrown back and to the opposite side, and seek for the margin of the sterno-cleido mastoid muscle. Begin on a line with the cricoid cartilage, holding the knife between the middle finger and thumb, and with the index finger on its back; press the point of the scalpel almost perpendicularly at first, and make an incision on the inner side of the said muscle, of about two inches in length. This incision should pass to the sheath of the vessel. In making it, you will come across a small vessel of no great importance, though it is true you might be embarrassed by the jet of arterial blood. It will hardly be necessary to apply a ligature to it, as the hemorrhage may, with much less loss of time, be arrested by torsion. But to continue: we find that our incision has brought us directly on the sheath of the upper portion of the common carotid. Now, we must cautiously dissect the sheath, and lay aside the descendens noni nerve, drawing it to the outside; and here I must caution you, only to divide as much of the sheath as is requisite for the application of the ligature. No unnecessary injury should be done to the parts, for such injury may seriously embarrass the recovery, by giving rise to purulent collections. We have now exposed the vessel, and cautiously opened its sheath; but before we proceed to the application of the ligature, I should call your attention to the *instruments* we use for that purpose, of which the one I now exhibit is a sample. It is called an *aneurism needle.* You see that it separates into two parts. After it has been passed round, the slide is thrown forwards, by which means the ligature is fixed in the hook at the end, and then the mere act of withdrawing the instrument, fixes the ligature under the artery. As regards the mode of applying the ligature in the present instance, you should remember that it is to be passed, from *without inwards.* The point of the instrument should be carefully insinuated between the vein and artery, taking care, at the same time, to avoid the pneumogastric nerve, and the descendens noni, which you have previously drawn to the outside. The next step is, to tie the ligature with a double knot, and sufficiently tight to sever the two internal coats, which may be felt to give way. One end of the ligature should be cut off, and the other brought out through the wound, which should then be brought together with adhesive strip; and the patient's head having been placed in such a position as not to stretch the incision apart, he should be kept perfectly quiet, and be otherwise attended to until his recovery. As I have already said, this operation should be preferred, when the case admits of your exercising a choice. But as circumstances will not always leave you at liberty thus to choose, you will sometimes find yourselves compelled to tie the artery near its origin. In such cases, the operation should be performed where the vessel traverses the *lower* triangle, which I have described.

So far as the operative proceedings are concerned when the object is to ligate the lower portion of the common carotid, there are two methods advocated for reaching the artery. The most common I shall describe first.

The patient should be placed in the same position as for the operation higher up, which I have just described; the operator should then feel for the border of the sterno-cleido-mastoid muscle, and, commencing his incision on its inner edge, about two and a half inches above the sternum, should continue it downwards to its origin from that bone. The incision should not be exactly parallel with the muscle, but should incline outwards, and encroach a little on its internal margin. This is the incision for the most frequently adopted plan, and will do very well.

The position of the incisions being their only difference, before we go on to the after proceedings, we will describe the other plan of commencing the operation. It is founded on the fact, that in the lower portion of the neck the fibres of the sterno-cleido-mastoid muscle separate, as they proceed to their different origins, and leave a triangular space between their two heads. Beginning at about two inches above the clavicle, the incision is made directly into this triangular interval. The artery may be reached by either method; and the subsequent proceedings are similar in both instances. Near the artery, we sometimes come in contact with a large plexus of veins coming from the thyroid body, which may cause some embarrassment. They must be drawn aside. The artery here is deeper seated than above, and its sheath should be opened with great caution. The sterno-thyroid and sterno-hyoid muscles will be found in the way, and must bê divided, or displaced inwards, together with the descendens noni nerve, &c. As in the operation above, the instrument should be passed *from without inwards*. The jugular vein, in particular, should be carefully avoided, as also, on the left side, the thoracic duct, which lies on the artery.

Ligation of the Arteria Innominata.

In this connection, there is still one subject to which I will call your attention, before we proceed to the consideration of the ligation of the branches of the carotid artery. It is an operation which I feel it my duty to describe; but concerning which I will first remark, that though it may be boasted of as an example of the achievement of modern surgery, for which we are indebted to our distinguished confrere, Valentine Mott, of New York, yet it is an operation which I would advise you never to perform, except upon the dead subject. I allude to the ligation of the *innominata*, in cases of aneurism low down in the neck. Even though it is possible, with the proper care, and guided by the light of anatomical knowledge, to cut down on the artery as advised, and enclose it in a ligature, what does this avail? After a few days, after the lapse of a short time, during which both operator and patient are buoyed up with hopes of success, this delusive interval is suddenly brought to an end by the death of the latter. The ligature has sloughed away; and the patient has been destroyed by a sudden gush of blood. The great current of blood sweeping through the aorta below, is too near to allow of the formation of a clot and the obliteration of the vessel. Dr. Mott was the first to perform this operation. He proceeded as follows. The patient was placed in a recumbent position, with his head bent to the left side. An incision, about three inches in length, was then made above the clavicle, not exactly parallel to it, but inclining to its edge as it approached its sternal articulation. This incision terminated just over the trachea, and, from this point, a second, of about equal length, was made along the inner edge of the sterno-cleido-mastoid. The skin included within this flap, was next dissected up carefully from the platisma muscle, and thrown back. The first incision was then cautiously deepened, so as to divide this muscle and the sternal origin of the sterno-cleido-mastoid, which were also turned back. The sterno-hyoid and sterno-thyroid were then cut, and turned over on the opposite side; and the sheath of the carotid artery was thus exposed, which was next opened, a little above the sternum. Then, with the handle of the scalpel, the subclavian artery was laid bare at about half an inch from its origin; and the dissection was continued to the bifurcation of the innominata, which was carefully denuded on its upper surface with the blade of the knife. Lastly, after, with the handle of the scalpel, the sides of the vessel had been freed from their cellular connections, the artery was ligated about half an inch from its bifurcation. A small blunt needle was used, which was passed from without inwards, and carefully insinuated round the vessel. In fourteen days the ligature came away, without hemorrhage; but on the twenty-third day, the bleeding commenced, and continued at intervals till the death of the patient, on the twenty-ninth. I do not think there is any necessity for so extensive an incision as was here practiced.

The arteria innominata may be reached by making a single incision, according to the method spoken of as McClelland's, or King's operation. The head of the patient is to be drawn back, and the surgeon's finger is to be placed on a point corresponding to the sterno-clavicular articulation. Commencing at this point, the incision is to be carried up on the line of the sterno-cleido-mastoid muscle. Then, the subjacent structures are to be cautiously divided *on a grooved director*, as you are operating in the neighborhood of very important parts. Having dissected as low as the innominata, the great difficulty consists in the application of the ligature. On one occasion, in which a worthy friend of my own was operating, he passed his instrument directly through the vessel. In applying the ligature, you should draw the head of the patient back, and pass your instrument very cautiously, far back, along the course of the vessel.

LECTURE XLVI.

LIGATION OF ARTERIES CONTINUED—OF THYROID ARTERIES, SUPERIOR AND INFERIOR—LINGUAL ARTERY—EXTERNAL CAROTID—EXTERNAL MAXILLARY—TEMPORAL—SUBCLAVIAN ARTERY—AXILLARY ARTERY.

Ligation of the Thyroid Arteries.

In consequence of the liability of the thyroid gland, when hypertrophied, to encroach on the trachea, and thus cause a serious impediment to the performance of the all-important function of respiration, it is sometimes necessary to reduce its size, either by excising a portion of the gland, or by cutting off its supply of blood. For the latter purpose, the operation of ligating one or more of the thyroid arteries, may be resorted to.

The ligation of the *inferior* thyroid arteries is the most difficult to perform; but to one who is thoroughly acquainted with the anatomy of the region, and who is sufficiently cool and intrepid, there is nothing which should deter him from giving to his patient the chance of relief which the operation, successfully performed, would afford.

The thyroid axis arises, as you are aware, from the subclavian. On its outer side, it has the scalenus anticus muscle; on the inner side, the sterno-hyoid and sterno-thyroid muscles, and also the carotid artery and pneumo-gastric and recurrent nerves, with the addition, on *the left side,* of the thoracic duct; in front is the jugular vein; and all these are covered over by the sterno-cleido-mastoid muscle, cervical fascia, &c. Such being the relations of the vessel where it is to be tied, you will readily perceive how cautious we should be in performing the operation. We should proceed rather with the *handle* and *point* of the knife, than with its cutting blade. Still, I say that the operation can, with the requisite qualification, be easily performed. The patient should be placed on his back; and the surgeon should feel for the space between the two heads of the sterno-cleido-mastoid muscle. The incision, beginning two or three inches above the clavicle, should fall into this space. The skin should first be separated, and then the incision should be carefully deepened, bearing in mind, that the vessel is to be sought directly on the inner side of the great internal jugular vein. The ligature, after we convince ourselves of the identity of the artery, is to be passed, and the wound treated as in other cases.

I have said, that the object of this operation is, generally, the reduction of hypertrophy of the thyroid gland, or the cure, or relief, of bronchosele. But to accomplish this object, the other thyroid artery must likewise, in some cases, be ligated. This is necessary, in order to cut off all the supply of blood. I would advise, however, that the operations be performed at different times. It is often the case, that the ligation of the *inferior* vessel, as just described, is rendered unnecessary by the previous ligation of the *superior;* which operation I shall proceed to explain. As I before remarked, it is by far the easier to be performed. Several methods have been adopted. The vessel, I need not inform you, arises from the external carotid, just after its origin from the common trunk.

According to one method, the incision is made from the upper border of the thyroid cartilage, to the sterno-cleido-mastoid muscle. I consider it easier to practice an incision, precisely as for the ligation of the upper portion of the common carotid, along the anterior margin of the mastoid muscle, and to dissect carefully, till the artery is brought into view. If, however, you adopt the other plan, you should cut, as I have observed, in the space between the cornu of the thyroid cartilage and the os hyoides.

Ligation of the Lingual Artery.

A far more important branch of the external carotid, often demanding a ligature, is the *lingual* artery. The operation is the more important, from the fact, that very often it is necessary to operate on the tongue, and the vessels being situated far back in the mouth, it is frequently very difficult, and even impossible, to arrest the hemorrhage, without ligating this vessel. Fungous growths also, subject to spontaneous hemorrhage, and situated on the tongue, sometimes require that the lingual artery should be taken up.

In the performance of this operation, you should be careful not to include the hypo-glossal nerve in the ligature. This nerve courses along parallel with the vessel; so that, in passing your ligature, you are very apt to include it in the knot. But, to go on to the operative proceedings, I may remark that you may tie the artery by the same operation that I have just described for the ligation of the superior thyroid; that is, to make an incision along the inner margin of the sterno-cleido-mastoid muscle, extending above the point of division of the common carotid, and to dissect carefully, till the vessel is exposed. Or, you may adopt another method—a modification of the other operation for the ligation of the superior thyroid artery. Placing the head of the patient in a convenient position, feel for the cornu of the hyoid bone, and commencing your incision there, carry it transversely back to the border of the sterno-mastoid muscle. Or you may commence from just a little below the ear, and continue to the space below the cornu of the hyoid bone, being cautious, in both cases, to separate the hypo-glossal nerve, to avoid the submaxillary gland, by turning it aside, and to dissect very carefully, till the lingual artery is found. It will be found advisable to divide the posterior part of the hyo-glossus muscle.

Ligation of the External Carotid Artery.

It may be necessary to tie the external carotid artery; but as the operation is nearly the same as that for ligating the common carotid, I shall content myself by remarking, that the only difference to be observed is, that, in the operation for taking up the external carotid you should commence your incision a little higher up, than in that for ligating the common trunk.

Ligation of the External Maxillary Artery.

The next branch of the external carotid is the external maxillary. This also, may be taken up by the same incision as is practiced in ligating the common carotid, with the same difference as for the external carotid. Another method, however, is generally pursued. An incision is made over its course, commencing on the lower margin of the jaw, at the anterior border of the masseter muscle, and going downwards and backwards. The artery is then carefully dissected out, and tied just before it enters the submaxillary gland; which, during the operation, should be carefully avoided, as its injury would be the cause of a troublesome fistula. This vessel may also be ligated where it ascends over the margin of the jaw.

Ligation of Temporal Artery.

You are aware, that as the external carotid mounts on the cheek, it becomes superficially situated, just in front of the ear, and receives the name of *temporal* artery. It is sometimes advisable to tie this vessel; and at this point, it is very easily detected, and a ligature is passed with facility. With the patient's head slightly inclined to the oppôsite side, an incision is made over the course of the vessel, about two lines in front of the meatus auditorius externus. We there find the tough temporal fascia. This is to be opened carefully, and we come to the sheath of the vessel, which is also quite strong. Arteriotomy is often performed on the vessel at this point. A smaller incision answers for the admission of a probe under the artery, which is then to be divided. The flow of blood can be arrested by compression; but it is often advisable to divide the artery transversely.

Ligation of the Subclavian Artery.

We must now take a step backwards. We propose to take up the consideration of the ligation of the great subclavian artery. In a surgical point of view, it is important to consider the vessel as it passes through three distinct regions. The whole artery is included, as you are aware, between its origin, (on the right side from the innominata, and on the left, from the aorta,) and the point at which it buries itself under the clavicle, on a level with the second rib; when it becomes axillary, and remains such, till it comes to the lower border of the tendons of the pectoralis major and latissimus dorsi muscles. We say that the subclavian artery passes through three distinct spaces. At first, it is situated deep and lies on the inner side of the scalenus anticus muscle. The first portion, then, is that part of the vessel between its origin, and the space between the scaleni muscle. Here it turns over the first rib. The second portion is that included between the *anterior* and *middle* scaleni muscles; it is from three-quarters of an inch to one inch in length. The third portion of the vessel extends from the outer border of the scalenus anticus, to the point at which it receives the name of axillary artery. The relations of the vessel differ in these different portions of its course. In the first part, we have, on the right side, the subclavian vein, cardiac, phrenic, pneumogastric, and recurrent laryngeal nerves, the pleura, and the internal jugular and vertebral veins. On the left, we have the pneumogastric, phrenic, and recurrent nerves, the pleura, the vena innominata, the left carotid artery, and the thoracic duct, all immediately surrounding it. When you consider the vital importance of all these parts, you will at once perceive the hazardous nature of the operation for the ligation of the vessel at this point. Even if the operation be successfully accomplished, there is considerable danger that the proximity of the ligature to the origin of the artery may prevent the due formation of the necessary coagulum. It is on this account that, though we frequently hear of the operation having been successfully performed, we always hear that the patient has died from secondary hemorrhage. Although such may be the circumstances of the case, *you may think* it best to perform the operation; though I really do not think that it will ever prove a successful one. Believing as I do, I would not take the responsibility of advising you ever to undertake it.

The diffiulties in the way of ligating the vessel in the *second* portion of its course, are also very great. The artery is here closely adherent to the anterior scalenus muscle, along the border of which the phrenic nerve passes in its downward course. But the danger of injury to this nerve, is not the only risk in performing the operation. Directly along the external border of the sterno-cleido-mastoid muscle, lies the external jugular vein; and if this be wounded, and air enter its cavity, death might be the immediate result; and again, we have the supra-scapular and transverse cervical arteries, both of which are liable to injury.

The vessel is to be reached, if you operate at this point, by means of an incision at the base of the neck, extending from the border of the trapezius to the sterno-cleido-mastoid. The parts are to be carefully divided, till the insertion of the anterior scalenus is made evident. Under this muscle, a grooved director is then cautiously insinuated; and it is divided upon it, carefully avoiding the structures I have mentioned. Recollect that the phrenic nerve lies on the *internal* edge of the muscle to be divided, and slightly in front of it. It should be carefully pushed out of the way.

As a general rule, I would not advise that you should attempt this operation. At any rate, whenever you have the option, you should prefer to take the vessel up in the third part of its course. Here the artery passes through the triangular space formed by the sterno-cleido-mastoid and the omo-hyoid muscles, with the clavicle. The axillary plexus of nerves lies directly above and behind it, and the vein in front and somewhat lower down. In front we have the skin, the superficial fascia, the platysma myoid muscle, and then the deep fascia, and cellular tissue, interspersed with delicate ramifications of veins. In cutting for this artery, several plans have been recommended. Some operate with one incision, while some prefer to make two. As good a plan as any is the following—Place the patient with his head thrown back and to the opposite side, and with his shoulder drawn down.

Then make an incision three inches in length, directly along the upper border of the clavicle, commencing from the sterno-cleido-mastoid muscle, and being careful to avoid injuring the external jugular vein. This first incision should extend through the skin and superficial fascia. Next you should carefully dissect your way through the subjacent tissues, till you come to the omo-hyoid muscle, the upper boundary of the triangular space I have alluded to. With the finger nail, and the handle of your scalpel, you should then carefully proceed, till you come to the deep fascia, beneath which you expect to find the vessel. A nerve will first be seen: it passes close to the artery, running on its upper side, and behind it. The vein lies, as I have said, below and in front; and the instrument should be passed close to the coat of the vessel, in order to avoid these structures.

Ligation of the Axillary Artery.

The axillary artery, in the first portion of its course, is very deeply situated, and if possible its ligation at this point should be avoided. It would even be preferable to take up the subclavian in its third division. Covered over by the large mass of muscular tissue composing the pectoralis major and p. minor, it requires a very large and deep wound for its ligation. If, however, it is determined to take up the vessel immediately under the clavicle, the following method may be pursued. It is a good plan, and was recommended by Lisfranc. The arm is to be forcibly abducted, in order to render the different origins of the pectoral muscle the more apparent, and an incision is made, commencing at the crease caused by the double origins of the pectoralis major, and following this mark outwards. This incision may extend through the skin. The superficial fascia, and cellular tissue are then to be carefully divided; when the line of separation between the two portions of the muscle will become apparent, and should be widened by means of the fingers, and the handle of the knife. The arm should then be brought to the side, to relax the parts, and the vessel will be discovered. The vein lies below the artery and somewhat in front, and in the living subject, occupies more space than you would suppose, if you form your conception of it from your experience at the dissecting table. It will be found to swell at each expiration. The nerves of the brachial flexus will be found above and behind the artery. Both these structures should be avoided in the application of the ligature.

This vessel may be tied in any one of its three divisions; viz: above the tendon of the pectoralis minor; behind that tendon; or still farther down, between the outer border of the pectoralis minor and the outer limit of the fold of the axilla. Let the patient be placed in a horizontal position, with the arm drawn up from the body, and also considerably rotated outwards. The artery being quite superficial may be felt; and an incision is to be made over it, about two and a half inches in length, carrying it above or below, according to the point desired for ligation. The first incision should not extend deeper than the skin, as important structures lie immediately below. The artery is, especially in its middle portion, completely surrounded with nerves, and the axillary vein is on its inner side, with other venous trunks that are tributary to it. All these parts should be carefully separated, and as many as possible should be drawn aside. If you are operating where the vessel is clasped by the roots of the median nerve, especial care must be taken to avoid including the same in the forceps or the ligature, which latter should be passed from within outwards.

LECTURE XLVII.

LIGATION OF ARTERIES CONTINUED—OF BRACHIAL ARTERY—OF RADIAL—OF ULNAR—OF INTERNAL MAMMARY—REMARKS ON THE LIGATION OF THE ABDOMINAL AORTA—LIGATION OF EXTERNAL ILIAC ARTERY—OF COMMON ILIAC—OF INTERNAL ILIAC—OF FEMORAL—OF POSTERIOR TIBIAL—OF ANTERIOR TIBIAL.

Ligation of Brachial Artery.

In the continuation of our subject, gentlemen, we take up this morning, the consideration, in the first place, of the *brachial* artery. Such, you are aware, is the name of the main trunk which supplies the arm. It extends from the termination of the axillary artery, at the insertions of the latissimus dorsi and pectoralis muscles, to its division into the radial and the ulnar, generally at the elbow. It goes in a slightly spiral direction around the arm. In the upper third of its course, it lies directly on the inner side of the coraco-brachialis muscle; and, as this muscle is inserted at about the middle portion of the humerus, we find that, in the next place, it courses along the inner border of the biceps muscle. Arrived at the elbow, the tendon of this muscle divides into two slips, one for insertion into the radius, and the other to become attached to the ulnar aponeurosis, the radial and ulnar slips of the tendon of the biceps. When the artery reaches this point, it glides directly under the ulnar slip, and soon divides into the radial and ulnar vessels, a little below the elbow. Again: following the course of the brachial artery, we find it accompanied in its upper part by the median nerve, for two-thirds of its length. The nerve lies at first on its outer side, and then passes over it, and gets on its inner side. The venæ comitantes are also in relation with the vessel, one on each side, with the artery lying between them. At, and in the neighborhood of the elbow, the artery is also overlied by the basilic vein, or some of the other venous trunks of the part; and in this connection, there is one circumstance, to which, *en passant*, I would call your attention. You are aware, that it is in the middle of the arm, just in front of the elbow, that venesection is most frequently performed, and it is well for you always to bear in mind that the artery lies generally under the median basilic vein, and consequently may be transfixed by the lancet. In this neighborhood, there are three superficial veins—the ulnar, the median, and the radial. The median often bifurcates, and sends one branch to the cephalic, and one to the basilic veins. That going to the ulnar side, is the *median-basilic;* that to the radial side, or to the cephalic vein, is the *median-cephalic.* The former is the one ordinarily over the artery; though sometimes the vessel is found under the median-cephalic. I would advise you always, before bleeding, to feel for the pulsation of the artery; and if this is perceptible, to abstain from opening the vein where it is felt. Should you by chance pierce the artery, let me hope that you will not attempt—as some may do—to conceal the nature of the accident, but, scorning such duplicity, proceed at once to do your best towards the remedy of the evil, by cutting down to the injured vessel, and casting a ligature around it. But to return. You may find it necessary to tie the brachial artery at any point of its course. Bearing in mind what I have already said of the position of the vessel, you will see that a line drawn from the union of the middle and anterior thirds of the axillary space, to the centre of a line drawn from condyle to condyle, will lie pretty accurately over its course.

If the artery is to be ligated in the upper portion of the arm, in a muscular subject, the coraco-brachialis muscle will serve for a guide. The incision should be made on its inner edge. If the patient is remarkably lean, the median nerve will often be perceptible to the touch, and by its means, the position of the vessel may be judged of; for we have already shown you, that in this portion of its course, it lies on the outer side of the artery. The needle should be passed from within outwards, being careful to exclude the venæ comitantes, one, as we have said, lying on each side.

If the artery is to be tied lower down, it will be easily reached by an incision made directly on the line drawn as I have already said. Sometimes it is necessary to ligate the vessel just above where it glides under the ulnar slip of the tendon of the biceps. It will be found, with equal facility, by cutting on the same line, but lower down. When it is necessary to take it up in the fold of the elbow, we must proceed with greater caution, in order to avoid inflicting injury on the median veins, and the nervous cords of the part. The incision is to be made below the ulnar tendon of the biceps, and on a line running centrally between the condyles, just over the middle of the joint. The skin is first cautiously divided, and the parts beneath are then carefully dissected with the point of a director. The median vein will first be discovered;

and then the artery will be found in a strong sheath. In passing the ligature, care must be taken to avoid the median nerve, on the inner side.

Ligation of Radial and Ulnar Arteries.

I have already stated that the brachial artery, below the elbow, resolved itself into the radial and ulnar. It is sometimes necessary to tie one or the other of these vessels. Just below the elbow on the upper part of the fore-arm, we find two muscular prominences, one on each side, leaving a triangular depression between them. They are formed by the muscles of the fore-arm taking their origin from each condyle, the extensor and supinator muscles from the external condyle, and the flexors and pronators from the internal. It is between these muscular prominences, in the triangular interspace they leave, that the division of the brachial artery, as a general rule, takes place. Starting from this point, with the radial nerve on its outer side, the radial artery, overlapped by the supinator radii longus muscle, passes down over the tendon of the pronator radii teres, and between the flexor longus pollicis and supinator radii longus. It may be desirable to take it up in the *upper*, *middle*, or *lower* third of its course.

It has been said that it is very difficult to ligate this vessel in the upper third of its course. I apprehend that the amount of this difficulty is considerably exaggerated. By following the rule I propose to give you, I think you will find the vessel with facility. If you feel for the central point between the condyles of the humerus and draw a line from that point to the styloid process of the radius, it is true that this line is not exactly a representative of the course of the vessel. But measure half an inch from this central point towards the external condyle, and draw your line from this latter point to the styloid process, and it will correspond precisely with the course of the vessel. Make your incision on this line and the artery will be readily discovered. You will first come to the supinator radii longus, which should be laid aside, and the dissection should then be continued till you find the sheath of the vessel.

A little lower down, on the same line, an incision will fall into the space between the tendons of the supinator radii longus and flexor carpi radialis, and the artery, being more superficial as it proceeds down the arm, will be found with still greater facility.

Sometimes it is necessary to secure the vessel just before it enters the palm of the hand. To find the artery at this point, all you will have to do will be to feel for the styloid process of the radius, and to make an incision into the first intermuscular space on its inner side. The aponeurotic expansion of the part will be then seen, with the artery entering it, and a small vein will be found in front of the artery, which it will be necessary for you to avoid.

We now return to the *ulnar*, the other division of the brachial artery. This vessel, at first deeply bedded, takes an oblique direction inwards from its origin, passing first under the pronator radii teres muscle, and then between the flexor carpi ulnaris and flexor sublimis digitorum. To find the trunk for the purpose of ligating it in the *upper third* of its course, an incision should be made, commencing an inch or more below the condyle, and in a line drawn from the inner condyle to the pisiform bone. The muscular structures should be turned aside, and the ulnar nerve, on the inner side, should be avoided. In its *middle third*, the artery is more superficial, and there will be no difficulty in finding it by means of an incision, of sufficient length, on the same line as before, but lower down. To ligate it at the *wrist joint*, feel for the pisiform bone of the carpus, and make an incision in the first intermuscular space on the radial side, taking care to avoid the vein which is immediately over it.

Ligation of Internal Mammary Artery.

Before we proceed to the arteries of the lower extremity, we will make a few observations concerning the *internal mammary* artery, and show you the method of ligating it. You are aware that this vessel passes down from its origin from the subclavian by the side of the sternum, but gradually receding from it to the diaphragm, which it pierces at its anterior portion, and that it finally inosculates with a branch of the external iliac (the epigastric) on the rectus muscle. Now, as the thoracic region is exposed to wounds and accidents of various kinds, the ligation of this vessel may often be a matter of importance. At first thought this may appear very difficult to accomplish. If, however, you recollect, that as the vessels passes down it gets more and more out from the sternum, and is soon some distance from that bone, you must perceive that your first impression is incorrect. At about the fourth rib, the artery is about three quarters of an inch from the edge of the sternum. Here the operation may with facility be performed. The incision should be made in a line with the rib, avoiding its lower edge, as you are aware that the *intercostal* artery runs on that border. This will expose the intercostal muscles, which are to be cautiously divided by passing a director under, and cutting fibre by fibre, working rather with the director than with the knife. After thus severing the muscular tissues, we next search for the artery, and pass the ligature around it.

Remarks on the Ligation of the Abdominal Aorta.

Let us proceed, in the next place, to the ligation of the arteries of the lower extremity, passing by the operation of tying the abdominal aorta. This last operation has been performed three times, and all three cases have terminated fatally. There is nothing to hope for in such a procedure. Though a spontaneous obliteration of the vessel has taken place and the individual has survived, this furnishes no valid argument for the application of a ligature. In the spontaneous obliteration of the calibre of the artery, the change is very gradual, and time is thus afforded for the anastomosing branches (the epigastric and internal mammary, the intercostals, lumbar, &c.) to accommodate themselves to the greater current which they have to transmit, by gradually expanding their calibre. The change induced by an operation is quite different. The obliteration is sudden, and the disturbance to the circulation is too violent to allow of the continuance of the functions of life. The operators in the three cases I have mentioned were Sir Ashley Cooper in 1817, and afterwards Mr. James, of Exeter, and Dr. Murray, of the Cape of Good Hope. Leaving this subject then, we go on to exhibit the method of proceeding in the

Ligation of the Iliac Arteries.

The *common iliac*, arising from the *aorta*, soon resolves itself into the *external* and *internal iliacs*. The former escapes under Poupart's ligament, and is called femoral; the latter dips down and resolves itself into a member of branches, for the supply of the parts about the pelvis. All of these have been successfully ligated. Without taking them up seriatim, we shall, for convenience, first point out the method of taking up the *external iliac*, choosing that plan which we regard as the most simple. When we examine the relations of the vessel at this point, we find the iliac vein on the inside, and the nerves on the outside; and we have therefore to search between these structures for the vessel we desire to ligate. Feel for the central point between the anterior superior spinous process of the ilium, and the symphisis of the pubis, which will indicate the position of the artery. Then commence your incision a little above the external abdominal ring, and carry it outwards and upwards, parallel with Poupart's ligament, to the extent of three inches, with the convexity downwards, giving it a semilunar direction. This will bring into view the tendon of the external oblique muscle, which is to be carefully divided by passing a director under it, and cutting down into its groove. This incision of the tendon of the muscle must be nearly as extensive as the division of the skin. It brings us to the internal oblique and transversalis muscles, which are to be hooked up. We should be very careful in dividing the parts, not to injure the epigastric artery or the spermatic chord. The cellular tissue is now to be carefully divided, and the artery will be found at the bottom of the wound.

Abernethy has proposed for the ligation of the *internal iliac artery*, an oblique incision through the abdominal parietes, cutting through the peritoneum and the oblique and transverse muscles, in a line extending from the umbilicus towards the spine of the ilium. This plan leaves the patient very liable to the supervention of ventral hernia, a risk which I think it is unnecessary that he should run. It is better, therefore, to cut below, and turn the peritoneum up, more especially, as by this method, the vessel is reached with equal facility.

If you desire to take up the *common iliac*, the same incision, extended higher up, will answer the purpose. The same method of procedure is to be adopted; the hand is to be passed into the wound; the peritoneum is to be turned back; and the position of the vessels is to be ascertained by the fingers. With a conveniently adapted aneurismal needle, the ligature may be applied to either the common or the internal iliac.

Our limited time not permitting us to dwell at more length on those subjects, the consideration of which will be of less practical benefit to you, than that of others, which will more frequently demand your attention, I must refer you for more particular statements concerning the ligation of the iliac vessels to the approved authorities in your hands. Without, therefore, taking up your time with further discussion of the matter, I proceed, in the next place to the

Ligation of the Femoral Artery.

This vessel we find situated in the center of the triangular space, formed by the sartorius and the adductor muscles. It winds, in a spiral direction, around the thigh bone, commencing from beneath the middle portion of Poupart's ligament, and lying on the inner side of the thigh, till after it enters the opening in the adductor magnus, when it arrives at its posterior region, and is called the popliteal artery. It may be ligated at three points; above its profunda branch, below that branch, or still lower, in the middle third of the thigh. If it is determined to take it up above the origin of the profunda, the incision should be made over the central point of Poupart's ligament, extending, in the direction of the axis of the limb. Dividing the skin, and then, with care, the fascia and cellular tissue of the part, you will find in front of the vessel, the great saphena vein. It should be carefully removed; and continuing the dissection a little farther, the sheath of the femoral vessels will be found. This is to be pinched up and divided, to expose the vessel; which may then be ligated by passing the aneurismal needle from within outwards, to avoid injuring the femoral vein, lying, as you know, on the inner side of the artery.

Should you desire to ligate the vessel below the point at which it gives off its profunda branch, the incision should be made on the inner edge of the sartorius muscle. These directions, however, are the less important, as the course of the femoral artery can almost always be detected by feeling for its pulsations. At this portion of its course, the vessel presents the same relations as above.

If it is desired to take up the vessel still lower down, before it enters the adductor magnus muscle, you should proceed as follows: Place the leg of the patient in a semi-flexed position, with the foot thrown inwards, so as to turn the knee out. By this position of the leg, on the thigh, the latter is necessarily rotated outwards, and the vessel is placed most conveniently for ligation. If, after having felt for the vessel, there is any doubt as to the point at which to make your incision, you may adopt the following plan—First draw a line from the anterior superior spine of the ilium, to the inner condyle of the femur; and then run another from the spine of the pubis, to the center of the upper border of the patella. Make your incision at the point of intersection of these lines, and it will bring you directly over the vessel. You will first come to the sartorius muscle. Draw this outwards, and you will find the sheath of the vessels directly beneath its former position. This should be opened, as in ligating the vessel above; and the ligature should be passed in the same way; though I would remark that in this region, the femoral vein lies somewhat behind the artery. Below this point, the femoral artery is engaged in the aponeurotic expansion of the great adductor muscle, and its ligation, after it enters this structure, should not be attempted.

Ligation of Popliteal Artery.

It can seldom be necessary, or proper, to ligate the *popliteal artery.* In cases of wound of the posterior tibial high in the leg, or of aneurism of the same region, it will be far preferable to tie the femoral artery, in either the middle or upper third of the thigh.

The operation, however, may be performed as follows—Place the patient on the abdomen, with the limb extended. Make an incision of three inches in length, commencing at a central point between the ham-strings, and extending down midway between the condyles. This will expose a bed of adipose tissue, on separating which the sciatic or popliteal nerve will be exposed. This must be turned aside, when below it you will encounter the vein, between which and the bone, at the bottom of the wound, the artery will be found, and may be ligated in the ordinary method.

Ligation of the Posterior Tibial Artery

In its upper third should seldom, if ever, be resorted to. The vessel here lies deeply buried under the large muscles which make up the calf of the leg, and it requires an incision of from three to four inches in length to reach its sheath. The whole thickness of the gastrocnemius muscle, with that of the soleus, has to be penetrated. This renders the operation not only a very severe one, but exceedingly difficult of performance. If, however, you should determine to try to ligate the vessel at this point, notwithstanding the difficulties I mention, you may succeed in reaching it, by practicing an incision of at least three inches in length, close to the side of the tibia, and carefully deepening it, while the head of the gastrocnemius is held back by an assistant, at the same time detaching the solius from the tibia, till the sheath of the artery is discovered; which you may then open, in order to apply the ligature. It is far preferable, in cases which seem to call for the performance of this operation, to tie the femoral artery in the middle third of the thigh.

The posterior tibial, however, as it descends, becomes more superficial, until, at the annular ligament, it is only covered by the fascia, reposing between the tendons of the flexor longus digitorum pedis, the tibialis posticus, and the tendo Achillis. At its middle third it is covered by the edge of the soleus, and by the deep fascia of the part, and is separated from the tibia by the flexor longus digitorum pedis. In this portion of its course, it may best be reached by an oblique incision, of about two inches in length. The soleus muscle and the fascia must be divided, (the latter being slit up on a grooved director,) and the sheath of the artery will be found.

The most convenient point to apply a ligature to this vessel, however, is where it lies behind the internal malleolus. You must bear in mind, that here the artery lies directly behind the tendon of the common flexor of the toes. If you flex the foot on the malleolus, and make an incision a quarter of an inch behind this, you will be directly over the vessel. A firm aponeurotic substance will first present itself. Divide this, and you readily discover the artery, accompanied by its veins and a nerve. You must be careful, however, not to open the sheath of the tendons.

Ligation of the Anterior Tibial Artery.

This artery, perforating the interosseous ligament soon after its origin, lies on the anterior face of that fibrous membrane for more than half its course, but gradually, as it descends, gets on the surface of the tibia, and then on the dorsum of the foot, and finally terminates by inosculating with the plantar arch through the first meta-tarsal interosseous space. It may be reached, in any portion of its extent after having passed through the interrosseus membrane, by an oblique incision over its course, similar to that I have explained for taking up the posterior tibial on the opposite side of the tibia. The lower down the incision is made, the more easily will the vessel be found.

LECTURE XLVIII.

TREATMENT OF ANEURISM CONTINUED—TELANGIEKTASIS, OR NÆVUS MATERNUS—TREATMENT—ANTERIO-VENOUS ANEURISM AT ELBOW—TREATMENT.

It may be proper, before I leave the subject of aneurism, to call your attention to one or two considerations which still present themselves.

After having applied a ligature to an important vessel, the after treatment of the case must be attended to. Such a course should be pursued as will most favor the due sustenance of the parts beyond, by aiding, as much as possible, the increased flow of blood through the collateral branches. The limb should be fixed in such a position as to favor the current, by placing these anastomosing branches in a relaxed and easy situation; and the parts beyond should be kept warm, by folding them in flannel; which, if the limb is found to be getting colder than natural, should be previously heated. It will sometimes happen, however, that in spite of all your efforts, an insufficient amount of blood will be sent to the parts. This unfortunate failure of the collateral circulation is more apt to occur to those in advanced life, the vessels becoming more rigid with time, and being often deprived, almost entirely, of the elasticity requisite to admit of their increase in calibre. The limb becomes cold; the circulation and nutrition is arrested; and after a while, the whole, or a part, of the surface beyond the point of ligation, assumes a dark color, and the portion thus marked becomes gangrenous.

Now, under these circumstances, what is to be done? Are we to sit quietly, and await the time when nature shall define the limits of the destructive process, or shall we attempt to define the limits with the knife? For my own part, acknowledging that there may be a difference of opinion in the matter, I would, as soon as mortification has undoubtedly established itself below the ligature, resort to the amputation of the limb above the point of ligation, unless the extent of the discoloration was decidedly limited; in which case, it is always best to wait, and see if, perchance, the collateral circulation may not gradually increase.

You will remember, that a few days ago, when speaking of the different kinds of aneurism, we mentioned one variety confined to the extreme vessels alone, the *aneurism by anastomosis* of J. Bell, the *telangiektasis*, (if indeed you can recollect *this* term,) or the common "mother's marks," or nævi materni. As this is part of the subject which has occupied us for the last few days, it is necessary for me to make a few remarks concerning its treatment. When we consider this, in all its phases, we are struck with one fact; viz: that there is no one method which has received the general sanction of the profession, though numberless plans have been proposed. When the affection is situated on the face, its cure becomes a matter of importance; or, at least, it is invariably considered so by the subject of the deformity, or, if a child, by its parents. The leading object to be accomplished is, of course, the obliteration of the ramifications of vessels involved in the dilatation. It has been advised to insert the virus of the cow-pox directly over the spot, provided the child has not been vaccinated. I need hardly remark, that, unless the affection is very limited indeed, this plan will not succeed. It has been proposed, that instead of the vaccine virus, the croton oil should be used, which acts, as you are aware, like a poison on the skin, producing a specific pustule. It is hoped that, by producing this eruption, the obliteration of the vessels will be effected. I have no doubt that, under some circumstances, the plan will succeed; yet I would observe, that the skin is very prone to take on an erysipelatous inflammation from such applications; and I must confess that I would not like to resort to such a method, particularly as applied to the face or head. Another method of cure is, to cut off the circulation. When we have to deal with an erectile tumor so far elevated above the skin as to allow of the application of a ligature around its base, we may, in that manner, succeed in effecting a cure; and even if the base is extended, we may succeed in enclosing it in a simple ligature, provided the skin of the part can be made to yield. It is necessary, in all cases, that the ligature should be applied at a spot where the vessels are in a normal condition. To accomplish this, the ligature should be prevented from slipping, if it is inclined to do so, by transfixing the base of the tumor with two or more pins. After the lapse of a few hours, the part becomes lax and heated; ulceration soon begins at the ligature; and after a short time the part exterior to it drops off, and leaves a clean granulating surface; which should then be treated as a simple ulcer. It has been proposed to hasten this result by a circular incision around the tumor, and passing the ligature in this cut, or by making the same incision after the ligature is applied. I would remark to you, that however much pain this plan may save the patient, you should be exceedingly cautious how you adopt such a method, as the vessels of the parts around are all enlarged, and the hemorrhage may prove difficult to arrest. Sometimes the tumor is so nearly on a level with the skin, (as is the case in the ordinary nævi of the face) that we are unable to avail ourselves of the benefit of the ligature. We may often succeed in curing such cases, by the use of red hot needles. A piece of paste-board with a hole cut in it, corresponding to the tumor, is to be placed over the part, and the heated needles, fixed previously in a convenient handle, are then to be passed through the base. If the tumor is of the ordinary kind, and limited in extent, the obliteration of its vessels may readily be effected. It has also been proposed, in limited cases, to tear and lacerate the distended vessels with a couching needle. Such a plan, however, is only applicable to cases of very limited extent. Again; it is advised by some to pass a series of the loops of a strong ligature through the base, by means of long needles; and, by drawing upon the ends, to constrict the tumor in that way. Such a plan is the more applicable to tumors of a slightly elevated character, and not extending over much surface.

But there are cases which will yield to none of these remedies. For the cure of such, we are constrained to resort to a more severe expedient—the extirpation of the affected parts by the knife. This is an operation involving some hazard; and it should be undertaken with caution. The part presents a perfect cross-fire of blood-vessels; and the danger of uncontrollable hemorrhage is by no means inconsiderable. I repeat, then, that you should be exceedingly cautious how you resort to the knife in cases of this description. If the affection is situated over a hard, bony surface, you may cut without fear, as you will be enabled to stop the hemorrhage with facility, by the effectual application of pressure; but in the soft parts, the risk you run is considerable, and you should make those who are desirous for you to operate, distinctly understand the danger, before you undertake the case.

The operative proceedings consist simply in excising the whole of the disease, if it is of not very great extent, by means of an elliptical incision. If the part involved is extensive, it should be excised portion by portion; practicing each time an elliptical incision, bringing the wound together, and repeating the operation till the whole is removed. The hemorrhage is sometimes appalling at first, stopping however in most cases, much sooner than you would anticipate.

This simple plan I have seen very successful. Of course you are to attempt to arrest the hemorrhage as soon as possible, by pressure, cold, &c., and to treat the incision as other wounds; being careful, if the part is exposed to view, that the edges of the cut should approximate as neatly as possible. To insure this nice adjustment, it will be necessary in some instances to dissect up the skin, and stretch it over, that its cut edges may meet. If this will not suffice to cover over the part, you should make a parallel incision on one, or, if necessary, on both sides of the wound, in order to admit of the requisite extension. Be careful, for if you fail to turn out a "nice job" in this respect, your knife may prove the cause of a deformity almost as great as that which it attempted to lessen.

In the cure of these erectile tumors, there are still two more expedients that have been resorted to. The first is the *actual cautery*. It has been applied all over the surface of the diseased portion, in order to destroy it entirely. But there are few cases in which I would recommend this measure. It has, again, been advised (and the advice has been in a few cases adopted) that when the affection involves the eye, or the antrum maxillare, a ligature should be applied to the superior portion of the carotid artery, and some have been so bold as to take up both of these vessels. The plan has failed; for in every instance, the collateral circulation has, in a short time, restored the original amount of blood to the tumor. It is now, consequently, abandoned.

I must request your attention still a little longer this morning, gentlemen, in order that, before I leave the subject of aneurism, I may make a few remarks concerning that kind which we have denominated *arterio-venous*, occurring from accident, or carelessness in the performance of venesection in the position ordinarily adopted for that operation. It will often occur, that the ligation of the brachial artery above the disease, fails to be of permanent benefit in arresting the motion of the blood in the distended vein, or aneurismal sac. When the ligature is applied to the artery as soon as the mishap has occurred, it soon drops off, and no further difficulty is experienced; but if, from ignorance, or a desire for concealment nothing is done at the moment of the injury, a regular, defini aneurism is soon formed. These are the cases in which the lig ture of the brachial will often fail, the reflex current soon restori the pulsation in the tumor. Should such a case occur to you, y best plan would be to tie the artery both above and below.

With these observations I conclude what I have to say on a rism. There are, in this connection, many pathological conditions of the blood and its vessels, which demand your attention; but my limited time compels me to select those subjects only, the consideration of which will prove most useful to the student. I would also remark, that here we conclude the second division of our course. To-morrow we will commence our third and last division, that devoted to the consideration of *regional surgery*.

PART III.

REGIONAL OR TOPOGRAPHICAL SURGERY.

LECTURE XLIX.

DIVISIONS OF BODY—INJURIES TO HEAD—WOUNDS AND BRUISES OF SCALP—TUMORS ON HEAD—CONTUSIONS ON SKULL.

In entering on this divison of our course, gentlemen, I would premise that we have to deal with an extensive subject, that comprising the particular operative proceedings, and surgical treatment, peculiar to the different parts of the body. In other words, we are to consider the *topography* of surgery.

When we observe the body in its entire condition, we find certain landmarks—certain elevations and depressions—by the aid of which we may divide it into a number of regions. Now, it is not my intention to enter minutely into this division of the body; yet some general arrangements of this kind will greatly facilitate our progress.

First, we have the *head* as a whole, sub-divided into head and face; next the region of the *neck* presents itself for consideration; then we have the *thoracic* region; then the *abdominal* region; and lastly, the *extremities*. These latter are to be sub-divided into arm, fore-arm, wrist, hand, &c., and thigh, leg, ankle, foot, &c.

To-day we will consider such accidents and diseases as appertain to the head; and we will, in the first place, take up such injuries as result from physical violence. The first portion of the head liable to such injury is the scalp, a not unfrequent position for wounds, contusions, &c.

I deem it unnecessary, on the present occasion, to enter into a minute discussion of wounds of the scalp, as I have already spoken at some length concerning wounds in general. But, although a wound on the scalp may be but a slight modification of a wound elsewhere, there yet may be some special relations, or peculiar circumstances, in some cases, which may give rise to certain complications involving the patient in more serious troubles, than if the injury had been inflicted elsewhere. Let us then consider in what these peculiarities consist. We find in this region of the body a large cavity, filled with the delicate structures of the brain, and surrounded with delicate vascular tissues, in close connection, through the medium of the skull, with the surrounding soft parts and the integument. From this arrangement of the parts it follows, that a wound of these soft parts may transmit its inflammatory action, through these vascular connections, to the substance of the brain itself. Even a slight wound may thus lead to serious consequences; and although, in general, such injuries will heal up with little or no inconvenience, it is well for you to bear in mind, that such is not always the case.

There is another peculiarity of these wounds, to which I must call your attention. You find here, a surface thickly covered with hair, the bulbs of which are possessed of a high degree of organization. Hence we are apt to have a violent erysipelatous inflammation, quickly spreading from the wound, and even extending its influence to the brain, and thus endangering the life of the patient. Besides these peculiarities, and the extreme density and thickness of the dermoid tissue, there are no differences between these injuries and wounds in other portions of the body, of sufficient importance to warrant my taking up time with their discussion here.

We have laid down, elsewhere, the rules for your guidance in the treatment of these simple injuries. I need not mention, that as the part is covered with hair, it will be necessary to shave off the same from the neighborhood of the wound, before you can adopt the measures which I have, on a previous occasion, explained.

A lacerated wound in this portion of the body should also be treated as elsewhere, provided none of the important local peculiarities present themselves. But, bearing in mind the liability of a most important organ to become affected, you should be ever watchful, and on your guard to meet the complications with their appropriate treatment. Should the brain or its membrane take on inflammatory action, of course you should resort to antiphlogistic and revulsive measures, with cold to the head, &c.

But not to dwell longer on this point, we will proceed to say a few words concerning contusions, and collections of blood or pus about the head. Cases have occurred, in which, from but a slight blow or injury inflicted on the head, serious consequences have resulted. There may be no external laceration apparent, yet the blood vessels below may have been ruptured, and an extravasation of blood, in quantity proportioned to the size of the injured vessels, may thus have been produced. This extravasation will present precisely the appearance of an abscess; and there is one circumstance apt to accompany this condition, which may lead you to the formation of an erroneous diagnosis. While in the centre of the tumor the blood is of a fluid consistence, along its circumference it has become hardened by coagulation, and forms a firm *border*, as it were. This condition may sometimes convey to the fingers precisely the same impression as that produced by a fracture of the cranial bone with depression. The deception is in some cases rendered still less capable of detection, by another circumstance which may obtain. The branch by the injury of which the flow of blood was permitted may have been of considerable size, and remaining open, may convey a pulsatory motion to the fluid portion of the tumor; which motion, in some instances, has so closely resembled the pulsations of the brain, that the operation of trepanning has been resorted to, to relieve the supposed *fracture with depression.*

The best *remedial measures* you can resort to in cases of this kind, I will now attempt to explain. In the first place, the head should be shaved. Cold and astringent applications should be applied, and *continuously* applied; that is, for three, or even four days successively; and *stimulating* applications may also be resorted to. With the judicious employment of these measures, your patient will generally recover without any serious consequences whatever. Such, however, is not always the result. The tumor being extensive, and pressing on the bones in its vicinity, may give rise to *caries* of these bones. Whenever, therefore, you find that after two or three days no reduction has taken place in the size of the tumor, no absorption of the fluid has been effected, it will be advisable to operate, and draw off the accumulation. Some contend that, for this purpose, a small puncture only should be made. This may do where the collection is limited; but in those cases in which the accumulation is great, and occupies a large extent of the cranial surface, it will often be requisite to open freely, and discharge the collection through a comparatively large orifice.

In passing, there is yet one allusion, which I would make in this connection. I refer to those bloody tumors often found to arise on the head. Although they are not preceded by any application of violence to the head, I may nevertheless be permitted to bring in their discussion on this occasion. These tumors are similar to those produced by violence applied as I have above described, and may, in like manner, lead you to suppose a fracture of the skull. They are generally found on the heads of new-born children, although I have met with them at various ages, even up to the twentieth year. As regards their origin, we are still in doubt. But whatever this may be, their physical characters, and their possible effects on the skull and brain, are the same as when the tumor arises from an injury. They have generally been supposed to be the results of violence inflicted on the head of the fœtus during parturition; but when we consider the fact, that they occur as frequently in cases of *easy*, as of *difficult* labor, and that they are sometimes found to originate long after birth, we are constrained to dismiss such an explanation as unsatisfactory. Whatever may be the cause, the treatment (like the appearance) of the affection, is the same as that I have detailed for the bloody tumors arising from the application of violence. They should never be opened, except when such a proceeding becomes necessary from their long continuance, or their effect upon the brain. Some contend that they should *never* be opened under any circumstances; and others that they should be opened only when it is found that no absorption has taken place. In my own practice, I have never opened an accumulation of this kind, except when I have apprehended bad results from its pressure on the points beneath. In these exceptional cases, I have opened the tumors freely, discharged their contents, and filling the cavities with lint, I have treated them as simple ulcers. In making this remark, however, it is my duty to tell you, that in one case, in which I considered it necessary to make the puncture, very serious consequences did soon ensue; the little patient, shortly after the operation, being attacked with convulsions, which ended in death. The question as regards this case occurs—did this result accrue from the operation, or would it not have occurred at any rate? At the first view you might suppose that the child died in consequence of the operation. Yet, when I take into consideration all the circumstances of the case—the rapid extension of the disease, and the sudden supervention of the bad symptoms occurring just before, and prompting me to perform the operation—I cannot but conclude that it had nothing to do with the sad result, and that the same consequences would have followed if the child had been entirely left to the effects of the disease.

Before we leave the consideration of injuries of the scalp, there is one collateral subject to which I may as well allude now, in order to prevent the necessity of recurring to it on a future occasion. The head is liable to be the seat of *encysted tumors*. These may be considered as divisible into two component elements; the cyst, and its contents. The former is a membranous substance, of a fibrous structure; the latter is generally a white, homogeneous, curdy material, perhaps an adventitious deposit from the vessels of the cyst. These tumors assume different shapes. They are sometimes pedunculated, and sometimes they are not. Their extirpation is often necessary; but as I have elsewhere given the rules to be followed in effecting such extirpation, I will not here enter into particulars concerning the operative proceedings. If the tumor is small, you may succeed by simply making an incision, and extracting the cyst with a pair of forceps. If it is large, it will be necessary to make a crucial incision, and dissect the flaps back; or an angular one, dissecting up the flap to the requisite extent.

But not to dwell longer here, we pass, in the next place, to consider the results of violence applied to the cranial bones. The results of these accidents differ according to the degree of force exerted, the extent of the injury inflicted, and the complications that may present themselves. The first result which we shall consider, is the simple *contusion* of the bone. You might think, at first glance, that this is an injury of no very serious character. We find, however, that between the tables of the cranial bones, there is placed a reticulated texture called *diploe*, which is arranged in cells, whose linings are highly organized, and in direct vascular communication with the sinuses. Now, if these latter are involved, we may have very serious—even fatal—consequences resulting from the extension of the inflammatory action along these vessels. The patient may be destroyed by the phlebitis itself; or the inflammation may be transmitted to the brain. If it seizes upon the dura mater, the exudation of plasma, or, still worse, the formation of pus, may interfere with the functions of the brain, by encroaching on its substance. This will give rise to all the symptoms of compression of the brain; and thus you perceive, that from a simple contusion of a portion of the osseous walls of the cranium, very serious consequences may result. But this is not all. The blow may destroy the vitality of the part; and the supply of blood being cut off from a portion of the bone, that portion dies; when we have a case of *caries* or *necrosis* of the bone. The portion whose vitality is thus destroyed, ceases to belong to the organization; when,acting as any other foreign body would, it so irritates the parts surrounding it, that there is a perpetual drain on the vital powers of the patient; and unless the surgeon interferes, this may continue so long as to prove fatal. Thus, gentlemen, you may understand how the mere contusion of a bone of the skull may, in the end, prove an accident of serious importance.

At our next lecture we will speak of fractures of these bones, and the specialities of their treatment.

LECTURE L.

FRACTURES OF THE CRANIUM—FISSURE—INCOMPLETE FRACTURE—FRACTURES WITH DEPRESSION—DIRECT AND INDIRECT FRACTURES—FRACTURE BY COUNTER-STROKE—COMPLICATIONS—TREATMENT.

In prosecuting the subject which occupied our attention at the last meeting, I have now to speak of fractures occurring to the cranial bones. Such injuries, of course, present a great variety of modifications. They may differ as regards the fracture itself, its position, extent, &c.; and they may differ in the complications they involve. These complications vary with the point at which the injury occurs. One of the meningeal arteries, for example, may be involved; or some of the different sinuses that course beneath the skull may be ruptured. But besides these, there are a variety of modifications which will present themselves as we go on.

Considering the subject under its most simple aspect, we have a mere solution of continuity of a cranial bone without any displacement. It has long been customary to call such an injury, a *fissure* of the cranium. Considering such a fracture as regards the bone itself, there is no cause for alarm; as it will heal as other fractures do. But when we consider its effects on the surrounding tissues, we find that serious consequences may result.

The violence of the blow may also cause concussion of the brain, and the symptoms will demonstrate that the fracture is accompanied by that condition of the nervous centre. As a *result* of the fracture, we may have inflammation transmitted to the brain and its membranes: or the blow may so impair the vital functions of the bone as to cause necrosis, with the consequences which I have already mentioned, in my last lecture, as resulting from such a condition. Such may be the accompaniments, and the results, of a fissure of the cranium.

Under the head of the more simple fractures of the cranium, we may mention the *incomplete* fracture. Let me explain the term, as referable to these injuries. You are aware that the bones of the skull are composed of two tables, separated from each other by a peculiar substance called diploe. Now, it may happen that only the external table is fractured, and the internal remains uninjured; or the reverse of this may, in a very few instances, obtain. Such injuries would be designated incomplete fractures. The fissure, instead of being limited to one direction, may assume a variety of forms and present several minor fissures running together; and yet there may be no depression of the fragments of bone.

By far the most serious complications of fractures of the cranium are presented by those cases, in which this *depression* occurs; and it is to this complication, that I would now invite your attention. In the first place, we have those cases in which, on one side of the fracture, the fragment of bone retains its natural level, while on the other side, the broken portion is depressed on the dura mater, and thus gives rise to most serious consequences to be spoken of presently. Here we have but a single inclined plane formed by the fractured bone. We sometimes find what may be called a *multiplex fracture,* in which there are one or more points of depression. Again; we may meet with a fracture which presents two inclined planes, converging to a line, or a point of union, which line or point is driven in upon the brain. This is denominated a *bridged* fracture, and is an injury of a very serious character.

We may have the fracture occurring in a number of irregular lines, converging to a central and depressed point, and presenting, externally, the appearance of a hollow cone. This is a *stellated* fracture, and is perhaps one of the worst kinds that can occur. Thus, I might go on mentioning a great variety of these injuries.

My object, however, is only to demonstrate the important *principles* of my department; and, therefore, I must leave the rest to be filled up by your own further investigation.

We may again divide fracture of the cranium as it occurs at the point at which the violence is applied, or in some other portion of the skull more or less distant from that point. In the former instance it would be called a *direct* fracture; in the latter an *indirect* one, or a fracture by *contre coup*, or counter stroke.

Let us now consider these fractures of the cranium in relation to their several complications. Some of these I have already mentioned. They vary greatly in their results, as you may suppose, according to the extent of these complications; and these complications differ also as to their immediate or remote effects. For an example of a remote effect, we may mention, that when a fracture occurs over one of the bony sutures of the head, one or more of the sharp spiculæ of the bone may be driven into one of the sinuses there situated, and will generally give rise, either to an extravasation of blood, or—from the great inclination of the venous trunks to take on a high grade of inflammation—to a violent phlebitis, or perhaps to both. These cases are generally fatal, either from the extravasation of blood, or from the phlebitis; though there are cases on record, in which recovery has taken place even under these circumstances.

Again: examining the subject in another aspect, we find that at the frontal sinuses above the orbit, and at the root of the nose, the two osseous tables recede from each other, leaving cavities which are lined with mucous membranes. These membranes may receive such injury from a fracture extending into these cavities, that, even though only the outer table is broken, a violent inflammatory action is set up, which may gradually extend through the remaining table of bone, to the membranes of the brain, and ultimately perhaps to the brain itself.

There is yet one complication of great importance, to which I must allude in this connection. We have seen that fracture may take place by what is called *counter stroke*. In the *os petrosum* we have, as you are aware, the complicated structures of the internal ear. The delicacy of these structures render this portion of the skull liable to receive injury in these kinds of fractures. When the exquisitely organized tissues of the part are thus injured, the result is very apt to be serious. From the close connection with the medulla oblongata, any inflammatory action induced by the fracture, may soon be transmitted to that body; and thus has life been destroyed, merely by the fracture having passed through this bone.

Let us now, gentlemen, investigate the *diagnosis* of these accidents. How are we to discover a fracture of the cranium? Whenever there is a solution of continuity in the scalp, it will be the duty of the surgeon to be especially careful in ascertaining this point of information. It is to be discovered by a careful examination with the fingers, and, if necessary, with a probe, after having carefully cleansed the wound, and drawn its lips asunder. If there is a fracture, it will generally be perceived that the continuity of the bony surface is broken, and the case must be managed as will be shown hereafter. If, however, there is no solution of continuity in the scalp, and there are no symptoms of compression on the brain, I apprehend that you would not be justified in cutting down to the bone at the point of injury merely to ascertain if there be a fracture. Even when the symptoms of concussion exist, it will always be best to wait for a few hours; as the more serious appearances are apt to be delayed in their exhibition. But when, after receiving a severe blow, the patient is found to present the the symptoms of violent compression; if he is lying in a comatose condition; if his respiration is laborious, his body cold, his sensation dulled, &c.; if such be the state in which you discover him, you must not wait a moment, but proceed immediately to make an opening to the bone by means of a triangular incision, or one of any character that you may find convenient. Having found the fracture, you must next ascertain if there is any depression, by a careful examination of the bone. Such, then, are the means for discovering a fracture of the cranium.

As regards the *treatment* to be pursued, you must see from the remarks which I have already made, that it differs in accordance with the nature of the complications existing in each case. When the fracture is a simple uncomplicated fissure, the treatment is very simple, and precisely similar in its general principles, to that of other fractures The proper hygienic regulations should be enforced, and the patient be kept quiet. The fracture itself is of little consequence; its complications are what require our watchful attention, and the patient should be guarded against those circumstances which here, as elsewhere, might develop too great a degree of inflammatory action. The bowels should be kept regular, no stimulating ingesta should be permitted, &c. &c. Such may be the plan of treatment in all simple cases of uncomplicated fracture, and even in those in which there is *very* slight depression, though in these latter, you should be even more careful in preventing the development of inflammation. The patient should be kept in a dark room, and in as perfect a state of quietude as possible; a cathartic should be administered, and any thing which would tend to excite the system or produce a determination to the brain, should be prohibited. Here you should be exceedingly cautious and watchful. Should you perceive any symptom of inflammation, any fullness of pulse or any twitching of the muscles, you should immediately tie up the arm, and, opening a vein, bleed till the pulse falters; bleed till the face becomes pale; bleed to make an *impression;* bleed boldly. Let the blood flow in a large stream, and if much reaction comes on, repeat the venesection again and again, if necessary. When you fear to go on, and the symptoms have not yielded, you should shave the scalp, and applying relays of leeches, allow the blood to flow from the capillaries of the head. Whenever this ceases to be a safe expedient, you may apply cold over the surface of the scalp, and warmth to the extremities, in order to invite a flow of blood to those parts. While doing this, the bowels should not be overlooked. Active cathartics should be resorted to, in order to obtain the aid of their revulsive action, in attracting the fluids to the lower portions of the body. Mercury will be found a useful agent in effecting a free action of the intestines, and it will be well to combine it with such a dose of tartarized antimony as will reduce the action of the heart. The cathartic action may be kept up by smaller doses of calomel, combined with smaller doses of tartar emetic, two or three grains of the former, with from one-eighth to one-fourth of a grain of the latter, repeated every two or three hours. To these measures we add the aid derived from any other revulsive that may suggest itself. Blisters to the back of the neck, to the calves of the legs, to the arm, to the trunk, will often be found of great benefit. Such, then, are the most important expedients which we resort to, not to cure the fracture, but either to prevent the development of those serious accidents which lead to inflammation of the membranes and substance of the brain, or to combat this inflammation when it has arisen. A fracture of the cranium may be attended with another result, concussion, which, as it may occur under other circumstances, I will postpone to my next lecture. There are besides, other consequences of fracture in this region, which I propose to discuss at another time.

LECTURE LI.

CONCUSSION OF THE BRAIN—CAUSES—SYMPTOMS—TREATMENT—COMPRESSION OF THE BRAIN—CAUSES—SYMPTOMS—TREATMENT.

The effect of violence suddenly applied to the cranium, is sometimes exhibited in a cessation or impairment of the functions of the brain. There is a disturbance, a kind of shaking up of this organ, interrupting its normal action. Such is the state of affairs that we denominate *concussion*. Concerning the pathological changes accompanying or causing this condition, we are entirely in the dark. It may result in death, either immediate or comparatively remote. It often passes off and leaves no trace of its having existed. In the fatal cases we can discover no lesion of structure, no solution of continuity, no extravasation, no visible cause of death. Still when we take into consideration the exceedingly minute structure of this noble organ, with its very slender parallel fibres, we may readily conceive how a blow may break a sufficient number of these latter, to stop the vital functions of the part, and thus cause death, although at a post mortem examination we may be unable to detect the injury. I must say I am inclined to think that a mere *concussion* (using the word in its *literal* sense) cannot cause death.

The outward manifestations or symptoms of the condition in question, may be divided into three stages or series. Let us see in what they consist. Immediately after the occurrence of the injury, there will be noticed either a serious impairment or a total suspension of sense and motion. The patient is cold and senseless; the intellect is dethroned; the pulse is feeble, slow, hardly perceptible at the wrist, and the respiration is slow and heavy, even stertorous, and interrupted in some cases. The patient exhibits no cognizance of external objects; there is either no manifestation of sensibility, or the feeling is found to be very obtuse. The reflex nervous actions *may* occur; the urine may be evacuated; but its passage is involuntary, and the pupil of the eye is dilated. Such are the phenomena presented by the first stage of concussion. The duration of this stage is variable, being dependent on the supervention of the second, which is irregular in coming on. This latter is characterized by the evidences of reaction. The pulse gradually expands; the skin warms up; the patient opens his eyes, and if he is called, he attempts to respond. Sensation begins in a measure to return; the pupil contracts, and vomiting takes place by reflex action, showing that the vital powers are rallying. The patient may now even get up and walk, and he may feel no pain, but finds that he is giddy. Sometimes the whole difficulty ends here; but such is not always the termination of the case. This stage may go on until it attains to an unnatural intensity. The pulse becomes too frequent; the tongue is red, and the skin hot, and sometimes covered with perspiration. The respiration is hurried; delirium, especially at night, is apt to present itself; convulsions come on, and twitching of the muscles may be observed. Such are, sometimes, the appearances marking the third stage, though in other cases another turn may be taken by the symptoms. The patient lies prostrate, passive; the respiration is heavy and stertorous, and the intellect is more and more enfeebled. Finally a complete coma comes on; the patient is partially paralyzed, and he passes his urine involuntarily. Such then are the three groups of symptoms to which I at first alluded. Some of them, you will perceive, are similar to those of compression. Attempts have been made to distinguish these from those occurring in cases of compression, though with but little, if any, success. For example, some have contended that stertor is never to be seen in cases of concussion. But I am inclined to think that any candid observer who has seen cases of both concussion and compression, will agree with me that this symptom may *often* be found in the former, though less frequently, it is true, than in the latter. Nor is this symptom exclusively confined even to these two affections. It is found in other pathological conditions likewise. Again, partial paralysis may exist in concussion as well as in compression. It may often be found to remain for some little time after falls, injuries, &c. Thus far, you perceive, we have no one positive criterion to mark the existence of compression, or of concussion. Time, however, here comes to our rerelief. *Concussion* is of but temporary duration; *compression* gradually increases in the severity of its symptoms.

Let us now consider what may be our duty, when we meet with a case of recent injury presenting some of these symptoms. You are called in a hurry to a patient who has just received a fall, or a blow; and you find him in this state of collapse, cold and senseless, with a slow and feeble pulse, and breathing heavily and slowly. What are you to do? I tell you, you are to do but little; *the world* says differently. A young surgeon is not unfrequently considerably embarrassed, under such circumstances, by the ignorant crowd around, who always cry "bleed," "bleed," into his ears. Why should you? I would enquire. There is no hardness of pulse, no height of action; the vital functions are indeed below par. I say, keep your lancet in your pocket; remove the neckcloth, or any other article of clothing, which may impede the respiration; apply warmth to the extremities, and the surface of the body; administer a dose of ammonia; and use all means of bringing up the system to its natural state of activity, instead of pursuing those measures that will reduce it still lower. Bleeding, in such a case, would be madness. You must apply sinapisms to the extremities and body, and administer stimulants by the mouth, if the patient can swallow, and if he cannot, you should resort to an enema of an exciting character. A half ounce of the oil of turpentine, rubbed up with two or three eggs and a pint of warm water, will be found a very useful expedient in such cases. By this treatment you may succeed in bringing on the symptoms of reaction. These I have already enumerated; and the question now presents itself, what are you to do in this stage? You are to watch your patient carefully, and keep your hands off, seeing that he is kept quiet, and undisturbed, mentally as well as bodily. If the symptoms of the *third* stage present themselves, it then becomes your duty to act, and to act with promptness and decision. If the brain exhibits evidences of inflammation, you should tie up the arm and bleed freely; and, if necessary, you should repeat the venesection again and again, until there is an alleviation of the symptoms. You should shave the head, and apply leeches to the surface of the scalp; you should administer an active cathartic, for the purpose of both depletion and revulsion; you should place a blister on the back of the neck, and sinapisms on the extremities; and then you should resort to repeated doses of calomel, combined with tartar or not, according to the urgency of the symptoms, or their persistance.

So much for *concussion* of the brain. Let us now say a few words about *compression* of that organ.

The causes of this condition, as you are aware, are of various kinds. In speaking of fractures of the skull, I described in detail, how *this* accident might prove a cause of encroachment on this important organ. Another cause, to which I have also alluded, is the rupture of some blood-vessel, and the extravasation of its contents. This, as I have said, may or may not be accompanied with fracture, and is therefore entitled to a separate place in the list of causes. This rupture and extravasation may take place at various points. The parietal region, at the anterior angle of the parietal bone, is the most frequent seat of the accident; for it is at this point that the *middle meningeal artery* occupies a position more exposed to injury than that of any other of the larger arteries. The various sinuses may also receive such injury as to be rendered incapable of retaining their blood; which may escape in such quantities as to encroach on the nervous centre. But I need not enter minutely into the causation of compression. It will be sufficient here, for me to state, that the condition which we thus designate, may be the result of any injury or disease, by which the brain is deprived of the space requisite for its normal action.

It sometimes happens, that the immediate effects of an injury may pass away, but in one, two or three days, the symptoms of compression begin to present themselves; or the patient may only for some time carry a tumor on his head. I have known two and three months even to elapse in some instances of this kind, before the evidences of compression began to appear. But, in such cases, a gradual change has been taking place. The patient begins to be annoyed with attacks of headache; which come on, leave him, and return irregularly, or yield temporarily to counter-irritant applications. Next, some twitching, or some anomalous action of a particular muscle will be observed, or some of the muscles may be affected with rigidity. Soon the patient may be noticed to be feverish at night. His manner may be changed, or somewhat confused; and his skin, at first heated, as the night advances, becomes covered with sweat, which by morning leads to a relief of the symptoms. This is repeated, night after night, and the intellect begins to give way. The face is flushed; the gait is tottering; there is an approximation to paralysis; and the muscular system is no longer under the perfect control of the will. The patient has now to give up his occupation; and we discover the danger he is in. If the compression is considerable, he is soon perfectly delirious; and total hemiplegia may present itself, the two pupils even being expanded in a different degree.

Where lies the origin of these phenomena? The foundation of the mischief is often to be found in the blow, which may have been inflicted a month before. This, after a short time, gives rise to an inflammation of the dura mater, or an accumulation of pus, encroaching on the brain itself. This accumulation may gradually increase in quantity, and give rise to compression by its encroachment on the surrounding parts. It may be situated between the membranes, exterior to them, or in the substance of the brain itself. Another cause of compression may be recognized, in the accumulation, in unnatural quantities, of the serous effusion peculiar to the brain; and again, I should mention all tumors and projections of bone, of sufficient extent to compress the brain.

The *results* of this condition differ according to the position of the compression, and its extent. If the pressure is exerted on both sides of the middle line of the brain, general paralysis will be the result; if on one side, paralysis on one side, and that side the one opposite to that on which the compression existed. There are a few exceptions to this remark; but they are not sufficiently numerrous to invalidate the rule. This fact may be accounted for by the anatomical arrangement of the pyramidal bundles of the medulla oblongata; the right column going, as you are aware, to the left of the brain, and the left to the right of that organ.

We pass, in the next place, to the most important part of the discussion—the removal of the compression, after we have ascertained its existence. It becomes your duty in some instances, to perforate to, and discharge certain accumulations already specified. Here we have sometimes a considerable difficulty to contend with. We may have no criterion to guide us to the point of compression. Generally, however, if your patient has previously received an injury on the scalp, and the symptoms supervene on this injury, you are justified in trephining at this point; and if you do not find the cause of compression immediately under the bone, and the dura mater looks dark and bruised, you may even be justified in puncturing *it*. If this membrane presents its natural appearance, however, you would not be right in disturbing it. Where there is nothing to guide you to the point of compression, and yet you know that extravasation has taken place, you must resort to active revulsive and antiphlogistic measures, as already detailed for inflammation of the brain. In general, if the cause of compression exists below the bone, the injury on the scalp will point to the place at which you should trephine. If one perforation is not sufficient, you should not hesitate to make another. You may, in some instances, find that the accumulation exists below the dura mater, or even in the brain itself, which you find yourself obliged to puncture. Such cases are generally fatal. But as favorable results have sometimes been obtained by this procedure, there is at least a *slight chance* for your patient, and you should not deprive him of it.

LECTURE LII.

COMPRESSION OF BRAIN CONTINUED—EPILEPSY FROM COMPRESSION—TUMORS IN DIPLOE—OPERATION OF TREPHINING—HERNIA CEREBRI—ITS TREATMENT.

At our last meeting, we were occupied with the subject of compression. I design to solicit your attention, this morning, to a few additional remarks on the same topic. I stated that a frequent cause of compression was, a greater or less extent of suppuration within the bony walls of the cranial cavity. The point of this suppuration, though most frequently between the skull and dura mater, is not always in that position. As the inflammation sometimes attacks the dura mater, sometimes the arachnoid, and sometimes the brain itself, the accumulation of pus may take place between these membranes, or even in substance of the enclosed organ.

Wherever the abscess may be situated, even if in the brain matter itself, there is a chance of recovery for the patient, if it is discharged. If recovery does follow the operation of perforating the cranium, a process of restitution takes place; and it is possible for the opening in the bone, if it is small, to be entirely closed up by an osseus deposit round its edges. If it be not closed, on account of its too great extent, a process of *absorption* takes place, by which its rough edge is smoothed and polished off. Again; it sometimes happens, after injuries to the head, that necrosis takes place, sometimes to a considerable extent; so as to oblige us, both to let out the accumulated pus, and to cut out the dead portion of bone. Be careful, however, not to follow the example of some surgeons, who appear to be possessed of a mania for trephining, and are intent upon scalping the patient for almost every injury to the head, in order to find some point at which to drill through the poor fellow's skull. No such scalping should be resorted to. Whenever the indications for trephining are sufficiently distinct, a simple crucial or angular incision will answer the purpose. Its flap or flaps are to be dissected up, to discover the point of compression, and the operation is to be conducted as follows.

Operation of Trephining the Skull.

Having determined upon the point to be perforated, and cleanly shaved the scalp to the requisite extent, the patient should be placed upon a table covered with blankets, or on a bed, with his head slightly elevated upon a pillow. The operative procedure must then be determined by the objects you have in view, and partly also by the condition of the scalp. While, in many cases, the latter is entire, and must be dissected up to expose the bone, instances occur in which the cranium has already been exposed by the external injury, or by sloughing of the integument, thus rendering this preliminary step of the operation unnecessary. Again; so far as the subsequent steps of the operation are concerned, you should proceed somewhat differently, according as you operate to elevate depressed bone, or to evacuate either blood or pus deposited within the cranium.

In either case the scalp is to be divided, when that step is necessary, down to the bone, by a crucial or angular incision; the flap or flaps are then to be dissected back, and the pericranium should then be carefully detached from the bone. So far as the division of the latter is concerned, you will use either the perforator, the Hey's or the cocks-comb saw, or the bone shears, according to the exigencies of the case, or the objects you have in view. Thus, in many cases of fracture with depression, the undepressed edge of the bone has one or more angular projections, which if cut off with a Hey's saw, or the bone shears, will enable you to insert your lever beneath the edge of the fragment, and elevate it readily to its proper level. This, when practicable, will save much trouble; but under other circumstances the perforator will be demanded. There are two varieties of this instrument. The first, and most simple, called a trephine, is composed of a circular serrated crown; a stem having a sliding centre pin, sharp and angular at the point, passing through it so as to be protruded or withdrawn at pleasure; and a handle by which the instrument can be rotated in opposite directions, so as to saw the bone. The second instrument, called a trepan, has a serrated crown like the preceding, but this is mounted on a bowed steel stem, terminated at the opposite end in a rounded knob, moving on a swivel joint, against which in using the instrument, the chin is made to rest, while the crown is made to revolve in one direction by means of the curved stem, like a carpenter's brace and bit. The trephine is generally preferred in America and England; the trepan in France and Germany. The former is doubtless the safer instrument, especially in unpracticed hands. The latter, however, is more expeditious.

If your object is to elevate depressed bone, the centre pin should be protruded, and secured at the proper point by the thumb screw attached to the stem of the instrument. It should then be fixed upon the edge of the undepressed portion of the bone, at the most eligible point near the edge of the fracture, so as to bring the range of the teeth of the instrument precisely parallel with the plane of the bone to be perforated. The instrument is then to be rotated, to and fro, gently at first, until the centre pin penetrates sufficiently to bring the teeth of the instrument to bear upon the bone; and this should be continued until the crown of the trephine has cut for itself a fair groove of sufficient depth to guide the instrument in the subsequent steps of the operation. The centre pin is then to be withdrawn, and the remaining thickness of the bone perforated by cautious and steady rotations of the instrument, taking care to examine the depth of the groove from time to time with the tooth-pick, so as to avoid wounding the dura mater, by cutting through one portion of the circle before the other. By this procedure, rather more than half a circle of the undepressed portion of the bone will be removed, and through the opening thus formed, the elevator may be passed so as to lift the fragment to its proper level. Any loose spiculæ of bone should be removed, and fragments of even larger size, if detached, should be treated in the same manner.

When you are under the necessity of trephining the skull to give exit to extravasated blood, or collections of pus, the scalp is to be treated precisely as above directed, but here an entire circle of bone must be removed—in some cases even more than one. In perforating, the instrument will penetrate slowly until it presses through the external table; but as soon as it reaches the spongy diploe, you will find resistance much diminished, and then it is that you must proceed with caution, making frequent use of the brush to keep the groove in the bone clear, and of the tooth-pick, to ascertain its depth. You will next find an increase of resistance, as soon as the instrument reaches the inner table, and having arrived at this point, the elevator should be inserted into different portions of the groove, from time to time, and used with gentle efforts, to lift out the circle of bone. I say gentle efforts—because if much force be applied, the outer table of the bone may be detached from the inner, before the latter is sufficiently divided, thus embarrassing the operation. It is at this juncture that the instrument must be worked with great caution, lest one portion of the bone should be divided before the other, and thus expose the dura mater to injury.

Having thus carefully removed a circle of bone, the blood or pus will be allowed free exit, if the deposit be situated between the skull and dura mater. Should the blood be firmly coagulated, and spread out beneath the skull, the coagula may be broken down, and drawn out with a blunt probe. In some cases the deposit will be found beneath the dura mater, in which case the discolored membrane will be protruded more or less into the trepan hole by the accumulation beneath. Under such circumstances, this membrane should be punctured, and the same course should be pursued, as intimated before, where there is abscess of the brain corresponding to the seat of injury.

Having proceeded thus far, you should carefully smooth off the sharp edges and spiculæ of the trepan hole; lay down the flaps smoothly in a state of close adaptation; secure them with adhesive strips; put your patient to bed; and use cold water dressings, taking care to watch him closely, and bring your antiphlogistic remedies actively into play whenever demanded.

A fracture of the skull may sometimes heal and leave a slight depression of bone, which, in time, may excite local irritation, and lay the foundation for epileptic attacks. As these depend on the depression of the bone, it has been recommended, in cases of epilepsy occurring for the first time after an injury to the head, to dissect up the scalp, to trephine the skull, and to elevate the bone. A sufficient number of cases of success after such a procedure have been recorded, to justify us, in well marked instances, in resorting to the operation; but I must caution you, that appearances are often deceptive in these cases. You should therefore be careful how you form your opinion.

The external table is sometimes depressed, without a corresponding condition in the internal one. Such a condition will lead you to suppose that the brain is encroached upon, and its functions interfered with by the bone, when the epileptic attacks may, in fact, be in no way connected with the injury. In such cases, the operation of elevating the bone will, of course, be found to have no beneficial effects upon the affection.

Sometimes the diploe between the two tables of bone is the seat of tumors of a fungous character; which after a while burst, and discharge a greater or less quantity of blood. By the pressure they exert around them, they, in time, cause an absorption of the neighboring bony matter; and, finally, they encroach upon the substance of the brain. As regards their *treatment* I must remark, that notwithstanding all that has been written on the subject, we should act with caution towards them, on account of their peculiar position. Slight escarotics, or astingents, may be resorted to; and, if it is possible to take hold of them, you may take off as large a portion as you are able to, by means of the ligature or knife. But as the tendency of these affections is to progress, in most cases they will increase and extend, until the health of the patient is gradually undermined, and he is destroyed.

In reference to the operation of trephining I should still say a few words. There are certain general principles which should be taken into consideration. As the tables of bone which constitute the skull differ in thickness in different regions of the head, it has been recommended that the operation of trephining should not be performed at certain points, where these two tables are not parallel to each other. For example; at the frontal sinuses, the tables of the frontal bone recede from each other; and, as a line drawn perpendicular to the outer table would not be perpendicular to the inner one, the trephine, after passing through the outer, and penetrating the inner, may injure the brain before it has entirely bored through the latter. This, however, may be avoided, by using first a large, and then a small instrument, and by changing the direction of the latter to suit the plane of the inner table. Whenever you are called upon to operate where the planes of the two tables of bone are not parallel to each other, it will be well for you to remember this suggestion.

There are yet some other particulars to which I would call your attention. On the parietal bone, we have the middle meningeal artery, and we can hardly perforate its anterior inferior angle without injuring the vessel, and encountering serious hemorrhage from it. By great caution, however, we may avoid this consequence; or we may arrest the bleeding, if it does occur, by the application of pressure in the hole we have made, by means of a piece of plate tin bent upon itself, and a dossil of lint. Again; we have the great longitudinal sinus and the lateral ones. Now, it has been advised, that if an injury should occur over any one of these, in any portion of their course, and that if the complications or consequences of that injury point to the operation of trephining as the sole relief, we should refuse to perform it, if we are obliged to operate at the point of injury. I think, however, that if the indications for trephining are clear, and the symptoms urgent, we may carefully undertake the operation; being cautious not to cut through one point before another. If the sinus is injured, the result is not necessarily fatal, as in all human probability the results of the compression on the brain would prove. I repeat, then, that if the necessity for the operation is *urgent*, you may resort to it, with these precautions, and others which will be suggested to your mind by each particular case.

Hernia Cerebri.

You will sometimes meet with the condition denominated *hernia cerebri*, resulting from the operation of trephining, the removal of coagula, the rupture of blood vessels, &c. It has also been denominated *fungus cerebri.* It is a protrusion of some of the brain matter from the cavity of the skull.

In your books, you will find at length the treatment for this *hernia of the brain.* Certain it is, that *some* cases do recover; though I apprehend that the credit of the cure is due to *nature*, rather than to the surgeon. I am under the impression, that a careful attention to the general condition of the patient is the best course to pursue. But, while I have little or no confidence in the means of treatment, I place great reliance upon the plans for the prevention of the protrusion. These consist in securing as speedy a union of the parts as possible, in the adoption of an active antiphlogistic treatment, and in a judicious resort to mercury. If we operate for the relief of a recent injury, these latter measures may be carried out to a great degree of exhaustion; but if we operate to evacuate a purulent collection, and at a more prolonged period from the receipt of the injury, we can adopt these debilitating measures but in a very slight degree, on account of the exhaustion the patient has already undergone. In such cases, you will be obliged to use your best powers of discrimination, and to rely upon your own judgment, as to the extent to which you should employ these agents.

ESSAY No. 6.

DISEASES OF THE EAR.

Otitis—Otorrhœa—Deafness.

Otitis, or inflammation of the ear, is accompanied by fever and an intense amount of pain; so great, indeed, is the suffering that delirium is sometimes caused thereby. The great amount of pain is thought to originate in rheumatism, and to be increased, oftentimes, by neuralgia; and—what adds greatly to the suffering of the patient—the pain is apt to increase as the day declines, and to reach its greatest intensity as night comes on.

In the treatment of otitis, where it is thought to arise from or be increased by rheumatism, great advantage will be derived from the local use of the tr. of aconite, in addition to other remedies. General and local antiphlogistic treatment should be adopted in all cases. Leeches to the inflamed part, cups, in front of, and behind the affected ear, and, if the symptoms are urgent, venesection, may all be resorted to. Much relief, too, will be afforded by syringing, or gently washing out the ear with some soothing tepid liquid, as warm water and milk, oil and laudanum, &c. Bark, iodide of potassium, &c., have also been found useful, particularly when the case is one of long standing; the first, with other tonics, being useful in cases accompanied by debility, and the second particularly adapted to such cases as originate in, or depend upon a scrofulous taint.

Otorrhœa, (from ους and ρεϖ,) literally signifies, a discharge from the ear; and, as this discharge may result from several different diseases, it may appear unnecessary to treat of it as a distinct affection. Any inflammatory action about the ear is apt sooner or later to be followed by a discharge: but what makes it necessary to regard this as a disease *per se* is, that although its original cause be removed, the discharge may take on a chronic form, continue for years causing much discomfort, and, if neglected or maltreated, may entirely destroy the sense of hearing. There can be no doubt, too, that otorrhœa very often occurs as a *catarrhal* affection, and even more frequently as the result of a *strumous habit*. In these latter cases the discharge is thin, watery and of a yellowish cast, accompanied frequently by an enlargement of the glands about the neck. Erysipelatous inflammation of the meatus is also a frequent cause of this discharge.

The treatment of otorrhœa will depend very much, nay entirely in most cases, upon its cause. The discharge being carefully removed by the gentle use of tepid water injected into the meatus, the cause of the discharge should be sought for. When inflammation is found, this must be treated upon general principles, accompanied by the local use of mild astringent lotions. If the parts are much thickened, white and callous, the nitrate of silver should be carefully applied, or some moderately stimulating injection used. Where polypus exists, this should be removed, the part cauterized, and if the discharge continues, astringent injections will soon put an end thereto. Should the discharge result from scrofula, our attention must be turned to the treatment of this diathesis; and so in every case, the otorrhœa must be regarded as *secondary*. Its cause must be sought; and when this is removed, the discharge will often cease at once; but when it continues, it will soon yield if treated as above directed.

The ear has been divided into the *pinna*, or external, expanded and membraneous portion, the *external meatus*, the *middle meatus*, or cavity of the tympanum, and the *labyrinth*. The external meatus commences at the internal surface of the pinna, and ends internally at the tympanum. The middle meatus, or cavity of the tympanum, extends from that membrane to the opening of the labyrinth, and contains the auditory chain of small bones. Into this chamber the Eustacian tube, the mastoid cells, and fenestra ovalis and rotunda open, and it is completely surrounded by the petrous portion of the temporal bone. The labyrinth extends from the tympanic cavity inward, and comprises the semi-circular canals, vestibule and cochlea; the cochlea uniting it with the middle chamber. Disease in any one of these divisions or chambers of the ear may cause deafness; but it is to the affections of the two first, or the external and middle chambers, that the attention of the surgeon is mainly to be confined. To treat of the diseases that might arise in the labyrinth, would be to transcend the proper limits of this essay, not only because such diseases are, strictly speaking, beyond the reach of surgery, but also because disease seldom if ever is known to originate there.

The meatus externus may become quite closed—and so produce deafness—from several causes. This occlusion may be the result of congenital malformation, or it may be caused by adhesion of the opposite surfaces, by the growth of polypi, from an accumulation and hardening of wax, or from the presence of foreign bodies.

Among the malformations sometimes met with, the meatus externus has been found quite wanting at birth, not a sign of its external opening being visible, and there existing not even a depression in the skin over its usual site. In such cases, after exploring the parts well and satisfying ourselves that no opening can be found, we should with a sharp scalpel make an incision, a line or two deep, over the usual portion of the opening. If the opening of the meatus is not then discovered, we can do no more; but if the canal is found, the incision should be enlarged and crossed by a second; and an elastic tube should be immediately inserted, and kept in the wound until the parts have perfectly healed; when one of ivory or silver may be substituted, and it should be constantly worn, as the parts are always prone to contract, and so gradually to restore the orifice of the meatus.

When the closure of the meatus results from the adhesion of its walls at the orifice of the tube, the same course as that above spoken of, is required.

Congenital deafness may also arise from the meatus being closed by a thin membrane stretching quite across it. In such cases the membrane may exist at the external opening of the tube, or may be found some distance within it. When near the orifice, this membrane should be freely divided by a crucial incision, as much of it as possible removed by forceps and knife, or scissors, and, if necessary, the part dilated by the insertion of a silver or elastic gum-tube. When the membrane exists some distance within the meatus, it has been advised to remove it by incision, puncture, or caustic. If incision be preferred, a long, thin and narrow bistoury, guarded to within a line of its point, should be passed to the membrane, and this then carefully divided by it. When puncture is used, a very small trocar, with a point projecting about one line, should be introduced into the meatus, and very gently and cautiously passed through the membrane. The use of nitrate of silver, carefully applied, so as not to bear upon surrounding parts, is perhaps the best method of removing this membrane. The caustic may be enclosed in a small, long and curved porte-caustic, and the stick being drawn to a very narrow point, should be carried to the centre of the membrane, which should be thoroughly cauterized. As soon as the membrane has been divided by either of the above measures, or has sloughed after the use of caustic, a bougie should be passed through the opening, and kept constantly there, the size being increased from time to time, until all fear of contraction is removed. Where the auditory canal is closed or narrowed by an approximation of its bony walls, surgery can afford no relief.

A very frequent cause of deafness, is a more or less complete closure of the meatus by polypi. These growths, when existing in this place, are nearly always of a benign nature, though sometimes they assume a truly malignant form. Wilde mentions a case of this kind, in his work on diseases of the ear, which proved rapidly fatal, and presented eventually every characteristic of a violently malignant growth, though it commenced in the usual form of an innocent polypus. Polypi may be found, existing singly or in clusters, at any part of the external meatus; though most frequently they are single, and found springing from some portion of the external half of the canal. They may be treated by caustic, ligature, excision, or extraction. When situated near the external opening of the meatus, the growths may be removed by either of these methods; though perhaps the best plan will be to combine excision with the use of caustic, by removing the tumor completely with the knife, (in the same way as is directed for polypi existing elsewhere,) and then cauterizing the surface whence it has been removed. When the tumor is situated far in, on the interior portion of the meatus, extraction only can be resorted to. Perhaps the best method is that recommended by Dupuytren, who advised that the tumor should be seized with a small, narrow pair of tongs—whose extremities are armed on their inner surfaces with small teeth or hooks—as near its root as possible, and removed by a combined process of twisting and dragging. Whatever method of removal may be preferred, the part where the polypus is divided should be freely cauterized, as soon as the bleeding has sufficiently ceased to permit of the parts being seen.

Foreign bodies, as insects, particles of grain, or some such small body, may get into the meatus externus, and produce deafness by closing the canal, or causing inflammation and swelling. These are sometimes very difficult to remove. In extracting these bodies from the ear, the peculiar form of the canal should be constantly borne in mind; as the meatus is not a straight tube, running directly inward, and with uniform level walls, but is directed inwards and forwards, with its inferior wall a convex, and its superior wall a concave surface. The canal also resembles in form a double truncated cone, the two smaller ends of which meet, thus being smaller in its centre than at its extremities. The upper wall, too, is shorter than the lower, thus throwing the tympanum into an oblique position, with its upper end several lines further out than its lower, and almost in a continuous line with the upper wall of the canal. The direction of the greatest diameter of the tube will vary also with the age of the individual, being almost horizontal in children, and becoming gradually more and more perpendicular, until in old age it is almost completely so. All of these facts should be well remembered when a body of any size has to be removed, as by attending to the precautions they suggest, much trouble will be saved, both to the patient and operator.

If the body to be removed is alive, (an insect, for example,) we should endeavor to entangle it in a bit of loosely twisted thread or cotton, and so remove it; or a probe covered by cloth smeared over with resin, soft wax, pitch or some glutinous substance, may be passed down to the body, and an effort made to attach it thereto. If these measures fail, the insect must be killed by the injection of warm water or diluted acid—repeated as often as may be necessary—and then removed, as any other soft body, by passing an ear-pick along one side of the canal until its end has passed the body; and then, by using the pick as a lever, this should be pressed gently out of the canal. Should this be found difficult, the pick may be passed in, and used to straighten the tube and steady the body, which can then be seized by a pair of very narrow forceps, and easily removed.

The cerumenous secretion naturally flowing from the glands which exist here, may collect and harden, so as effectually to close the meatus and cause deafness. Under these circumstances, the hardened wax should be softened by the injection of warm water, and it will then be easily removed by the ear pick.

Where the body to be removed from the ear is hard and solid, as some grain or seed, the case becomes much more difficult. In some cases of this kind, the utmost exertions of the most skilful surgeons have entirely failed to give relief. Under these circumstances, the patient should be so placed, that the ear, while exposed to a full light, shall be also perfectly open to the surgeon's view, and the head must be firmly held by an assistant. Thus the patient may sit in a high-backed chair, the surgeon standing behind, and the asssistant alongside of him, and the head being placed against the back of the chair, in such a position as shall cause the injured ear to look upward and incline slightly towards the surgeon. The walls of the meatus being carefully oiled, a small ear-pick or scoop should then be passed along the upper wall of the canal, and insinuated with great care beyond the body: this should then be gently pressed out, using the instrument as a lever. In cases where this method fails, a long, narrow pair of forceps, whose blades are kept open by a strong spring, may be passed to the body, the points being pressed together till it reaches it, and then the blades permitted to expand: thus the walls of the meatus will be pressed away from the body, beyond which the points of the instrument can then be insinuated without difficulty; and the body thus seized may be removed without trouble. I have in this manner succeeded in removing a grain of Indian corn of large size from the ear, after trying every other method for some time in vain.

Accidents and diseases affecting the tympanum, or drum of the ear, are frequently the causes of deafness. It is impossible, however, in a treatise like this to do more than glance at some of the most prominent of these.

A violent blow on the side of the head, a loud and unexpected noise, or any thing that may cause the air to be driven violently and suddenly into the meatus, and so against the membrane, may rupture it, and destroy the sense of hearing in that ear. A very familiar example of this, is presented by cases of deafness resulting from standing near artillery while it is being discharged. In these cases the deafness generally is of short duration, as the wound if undisturbed will in a short time heal, and give no further trouble. So likewise in cases of similar injury from other causes, the wound should not be interfered with, unless inflammation arise; and this should be treated by local antiphlogistic measures. "I believe that the best treatment which can be adopted for recent injuries of the membrana tympani, is to let them alone; unless inflammation should arise; when it must be met by local depletion." (Wilde on the ear.) The tympanum is also subject to acute inflammation or myringitis. This affection is accompanied by very severe, acute pain, sometimes so violent as to cause delirium; and this pain is generally increased by any thing that may cause a shock to the ear, or give rise to motion of the air within the tympanic cavity or external meatus. Thus any noise, or any motion of the head, as in sneezing, coughing, &c., will add to it; and it is found, too, generally to grow worse as night comes on.

Deafness is sooner or later the result. Toothache, earache, and violent headache frequently occur; and in very severe cases the sufferings of the patient are increased by every throb of the carotid arteries.

Every shock that can affect the ear should be avoided; and exposure to cold, especially, should be carefully guarded against. Mercury, in one or other of its combinations, should be freely used; and locally the antiphlogistic, combined with a soothing treatment pursued. Leeches should be applied around the external meatus, and the part exposed to moderately warm vapor of water. The pain will be much relieved by this application of warm vapor, and it may be frequently resorted to.

Should the inflammation run so high as to cause the destruction or ulceration of any portion of the membrane, and the ulcer continue after the inflammation has subsided, a very fine point of nitrate of silver should be applied to the inner margin of the ulcer about once in four or five days. This will generally cause it rapidly to heal. Should the ulcer, however, appear to enlarge after the first or second application—or indeed at any time as the result thereof, the caustic should immediately be discontinued.

Where a large portion of the membrane is destroyed and so a considerable opening produced, it has been recommended, first by Mr. Yearsly, of London, to restore the sense of hearing by inserting small pieces of moistened cotton into the meatus, in such a manner as just to close the opening through the membrane. So successful has this simple treatment proven that it is now universally recommended. A thin plate of gutta percha, or vulcanized India rubber, has been advised as a substitute for the cotton: these have not, however, been found to act so well.

Inflammation of the entire tympanic cavity, also known as acute otitis, is one of the most painful diseases to which man is heir. Arising from almost the same causes, it is accompanied by the same symptoms—but in an aggravated form—and is to be treated in the same manner as myringitis. The great source of danger in this affection, is the proneness of the inflammation to extend through the mastoid cells, or the labyrinth, to the duramater. When this occurs, death is not unfrequently the result, preceded by all the symptoms of cerebral disease.

As has been observed, the Eustachian tube, which connects this chamber with, and conveys air into it from the throat, opens in this cavity, and its lining membrane is continuous with that of both these passages; and it is hence thought highly probable, that inflammation sometimes extends to the ear from the throat, through this tube.

"The Eustachian tube consists of an osseous and a cartilaginous portion; the average length of the former is about half an inch, in width it is about an eighth of an inch from above downwards, and not more than a tenth from before backwards, or from side to side. This tube is separated from the carotid canal by a very thin plate of bone. The membrano-cartilaginous portion is fully an inch long; it is attached to the notched, irregular extremity of the osseous, in the petrous portion of the temporal bone, and also to the edge of the sphenoid. This is generally the narrowest part of the tube, and from thence in its downward and inward direction to its guttural orifice in the pharynx, it gradually enlarges, but more particularly at its lower extremity. It thus resembles a straight trumpet, the small enlargement of the mouth-piece being at the tympanum, and the larger, bell-shaped extremity opening behind the posterior nares, with its lower margin a little below the floor of that aperture." (Wilde.)

Whatever may be the exact object of this tube as connected with the ear, its closure, by whatever caused, immediately affects the sense of hearing, and this to such an extent sometimes, that the membrana tympani has been punctured to give relief. Whether or not the theory upon which such an operation has been performed, be correct, it is a well observed fact, that hearing is so much injured by the closure of this tube, as to render it always desirable to remove the obstruction therefrom, if possible. Several methods of passing a probe through the Eustachian tube have been recommended by different surgeons, and never having performed the operation, I shall confine myself to a few quotations.

"Cathetecism of the Eustachian tube," says Malgaine, "is performed by three different passages—by the mouth, by the corresponding nostril, or by the opposite nostril." "The first method was invented by Guyot of Versailles, in 1724, and is now generally abandoned. The second, invented by Cleland in 1741, is performed in three ways." The most common method is to use "a sound curved like a female catheter but smaller and without eyes at its sides, but open at each end, carefully oiled before it is introduced. The patient being seated on a chair, with his head slightly thrown back and supported on a pillow, the surgeon standing before him, or a little to one side, takes the instrument as a pen, and presents its beak at the nostril, on the same side as the obstructed tube, and passes it rapidly on the floor of the fossa, its convexity looking inwards and a little upwards, its concavity downwards and outwards; at about two inches depth he reaches the velum of the palate, which is announced by the patient making a sudden effort at deglutition. The beak is then turned outwards and upwards, by a movement of rotation given to the shank, without quitting the external wall of the nostril, so as to reach the superior part of the maxillary meatus; and in continuing to push in this direction, you reach the opening of the tube, which passes obliquely outwards backwards and upwards. The sound is pushed in to a sufficient depth by a moderate pressure. To make the injections, a syringe must be fitted into the mouth of the tube. If the injection is stopped in the Eustachian tube, the syringe should be withdrawn, and a blunt probe introduced as far as the obstacle to destroy it." It has been recommended to use air for injecting, instead of water. When so used, the arrival of the air in the cavity of the tympanum, will be recognized by the sound it produces on the drum, the surgeon detecting it, by putting his ear near the meatus of the one operated on. The injection should be made with a syringe or caoutchouc bottle, precisely as in the use of liquids. "When the beak of the sound has reached the posterior orifice of the nasal fossa—in other terms, the extremity of the osseous floor—M. Gairal causes it to describe *a quarter of a circle* by a slight movement of rotation outwards; then advancing a few lines it passes right into the orifice." This movement of rotation should be so exactly limited to the *quarter of a circle*, "that M. Gairal has engraved on the sides of the lips of his sounds, figures indicating to the operator when the movement is complete. If it is not extensive enough you descend into the pharynx. If too extensive, you strike against the internal side of the base of the pterygoid process.

"The orifice being occupied by the beak of the sound, Gairal indicates, as the third step of the operation, to continue the movement of rotation, and to raise the beak upwards and outwards, at the same time pushing it in." The curve of the instrument should depend upon the directions of the nasal fossa and tube. Boyer used a sound whose curve was of one hundred and thirty-six degrees, Gairial "one of 145°." Wilde, in his work on aural diseases, recommends, as a substitute for all other instruments to be passed through the Eustachian tube, "a fine ivory bougie from which the earthy portion has been removed by an acid, and the end of which when previously moistened for some time becomes soft and pliable, yet possesses more resistance than cat-gut."

The third method, or that of Deleau, is thus described: "When the corresponding nostril is from any cause obliterated, you may enter the tube from the other, with a more slightly curved instrument, the beak of which is turned back a little towards its convexity. It is passed with its concavity turned downwards and inwards along the inferior border of the septum. When once arrived at the velum of the palate a movement of rotation should be given to it, sufficient to raise its extremity behind the vomer and reach the tube; the rest as usual. The patient himself, if he has ever been operated on before, will tell you if the sound is badly placed. It may, moreover, be known by the position of the sound, or by injecting air or water. If the sound is well placed, the injection enters the cavity of the tympanum or does not reach it at all. If it is badly placed the injection falls into the pharynx. It is better to push the sound briskly, though gently, rather than too slowly, as it causes less pain and fatigue." Wilde recommends the use of a moderately large sized silver catheter, as more easily managed, less apt to cause irritation by catching in the mucous membrane, and also more apt to be grasped tightly by the Eustachian orifice: and, whilst he deems the operation as very seldom required, and justly prohibits it where the membrane of either this tube or the cavity of the tympanum are inflamed, still he admits that there are cases demanding such an operation. In these cases he advises the use of air instead of water as an injection, and figures and describes quite an efficient and convenient apparatus for the purpose, in his work on diseases of the ear; to which, for any further information, the reader is respectfully referred. T. S. W.

LECTURE LIII.

DISEASES OF AND ACCIDENTS TO THE FACE IN ITS SOFT PARTS—WOUNDS OF EYELIDS—OF CHEEKS—PAROTID FISTULA—TREATMENT—TIC DOLOREAU—AUTOPLASTIC OPERATIONS—UNION OF EXCISED PARTS NOSE, ETC.—INJURIES OF THE BONES—MUCOUS FISTULA—COLLECTIONS IN ANTRUM MAXILLARE.

We will, this morning, turn our attention to the diseases and accidents to which the face is liable. This region, though limited in extent, comprises a great number of parts, so different from each other, that they present a variety of subjects of great interest. In the first place, we have the soft parts—the skin, the muscles, the lips, the cheeks, the eyelids, &c.; all of which are subject to injury, and liable to fall into certain pathological conditions. So far as wounds in these parts are concerned, the same general principles that I have so often alluded to, must be carried out; though still, in this connection, some particular considerations should be regarded; some peculiar modifications of the general treatment must be called into requisition.

There are also some complications occasionally accompanying wounds in these parts, which deserve our attention. For example, it has been found, again and again, that, in consequence of some obscure relations between the supra-orbital nerve and the retina of the eye not yet understood, whenever that nerve is wounded, blindness of the corresponding eye is the result. I mention this as an interesting pathological fact; though I do not attempt its explanation. The knowledge of the fact has also a practical bearing. It should warn you to avoid this nerve when operating about the part. I have seen the same result follow an injury inflicted by a piece of glass on the nasal branch of the fifth pair of nerves, where it comes out between the os nasi, and the cartilage of the nose. Insensibility of the retina was the result of the wound.

But to proceed: a wound is sometimes inflicted on one of the *eyelids*. When you consider the importance of the injured part to the globe of the eye, you cannot fail to perceive the necessity for great care in the treatment of such a wound. This will vary according to the extent of the injury, and its character. If it is a simple incised wound dividing the lid, it should be cleansed, and the edges brought together, and retained in exact juxtaposition by means of the interrupted, quilled, or twisted suture. I prefer the last mentioned. German pins are the best to be used for the twisted suture, should it be resorted to. In all operations with the needles, the conjunctiva should be carefully avoided.

If the wound is of such a character, that the loss of substance is too great to admit of the approximation of the edges, and the ball of the eye is exposed, you may well understand that, if you do not adopt some means of covering the latter, it will remain exposed, and blindness of the eye will ultimately be the result. If, then, the parts will not meet, you will be obliged to resort to an *autoplastic operation* to supply the deficiency; you will be obliged to take a part of the integument from one of the nearest, and most convenient points, the forehead, the temple, &c. By this process you can patch the eyelid very well; as you may also the lips, and other parts of which we shall speak as we go on.

Of the wounds of the cheek, when uncomplicated with injury to any nerve, gland, or duct of a gland, we will say nothing, as they differ in no essential particulars from wounds in other parts. But it often happens that the parotid gland, or its duct, is involved in the injury; and a salivary fistula is the result in a large proportion of such cases, when they have been neglected. There is a perpetual flow of saliva externally. It trickles over the cheek; excoriates the surface; and annoys the patient excessively. This may be the result when either the duct of Steno, or the gland itself is wounded; for it is not possible to wound the latter, without injuring some of its numerous excreting tubes. The rest of the wound in the cheek will, in time, heal up, leaving only the fistulous orifice to the gland, which continues to discharge a portion of its secretion by that opening. Now, whenever such a complication exists with an injury to these parts, you should be very careful, in the first instance, to approximate the edges of the external wound so closely that, if possible, you may secure their union by the first intention. Should the gland itself be wounded, you should, in addition to the ordinary means, apply a graduated compress, so as to bear upon the tubes that are injured. Should the duct of Steno be wounded, the external edges of the wound should be approximated so closely as to prevent the possibility of the escape of the saliva in that direction. To secure this object, a suture, in some cases, must be resorted to. The internal wound may be left open, and thus the saliva will escape into the mouth, and produce no uneasiness. These remarks, concerning injury of the parotid gland, may also apply to that of the submaxillary.

We pass now to other complications. In wounds on the side of the face, the nerve of motion is sometimes injured; and muscular paralysis of one side of the face is the result. Unfortunately our art is here unavailing. But experience has shown, that fortunately in some cases of paralysis of one side of the face from a wound of the facial nerve—which is the nerve of motion—or some of its branches, a deposition of adventitious material takes place; and, contrary to what might, *a priori*, be supposed, the nerve is reunited, and the functions of the muscles are resumed. Whether there is really a deposit of nerve matter, or whether the result is achieved by anastomatic communications, are disputed points. The fact, however, that the part sometimes regains its nervous functions, is incontestible. That the infra-orbital, or the nerve of sensation, will also regain its function after having lost it from an injury, may also be mentioned as a parallel case. And in this connection, I would call your attention to another particular.

Many persons are subject to a most painful affection of the nerves of the face—*neuralgia* or *tic doloreaux*. When it was at first thought that the seat of this disease was in the branches of the sensitive, or the infra-orbital nerve, it was supposed that its division would prove a radical cure. This supposition has not been verified by experience; for the pain would invariably return, after a time, in those cases in which the division was resorted to. It was then supposed that the failure was due to the reunion of the nerve; and it was proposed, with a view to prevent this, not only to divide the nerve, but to excise a portion of it. But even this failed. So that in modern times, though the operation is still recommended in the books, and is even occasionally practiced by some surgeons, it is no longer much relied on.

In wounds of the face in general, accompanied by such a loss of structure that the union of the remaining parts is prevented, and which would, if the wound were left to heal, prove the cause of any distortion of countenance or the impairment of some organ, we supply the deficiency, as in the case of the eyelids, by robbing the surrounding parts. We dissect up a flap of integument, in size proportioned to the amount of substance wanted, leaving it attached by a peduncle, as it were, to the part, and turn it round into the wound, cutting it to the requisite shape. It is there secured by sutures, and after union has taken place, the "peduncle" is divided, and the parts pared down to a natural level.

In simple wounds of the nose, we must regulate our treatment by general principles. If there is much loss of substance, we resort to an autoplastic operation. And here one circumstance suggests itself, to which I will allude, as it is a subject of great interest to the physiologist, to the pathologist, and especially to the surgeon. It sometimes happens that an instrument sweeps across the nose, severing the skin, the cartilage, the cellular tissue, &c. Now, if such a wound be left to itself, a most hideous deformity is the result, and what I wish to remark is, that in many instances, although the part has been entirely severed and the divided portion has even remained apart for some time, yet upon replacing it in its natural position, it has been restored to its vital actions, and has reunited itself to the place where it undoubtedly "ought to be." Although the books do relate some very tough stories in reference to this circumstance (and I do not by any means request you to believe them all,) although you may read of the precious organ having been *bitten* off, trampled in the dirt, &c., and stuck on with success, even after such treatment; yet it is nevertheless true, that union does take place in a considerable number of cases, after a part has been excised. If any length of time has elapsed, however, it is idle to hope for reunion, though there can be no harm in trying the experiment. With severed fingers I have repeatedly made the trial, but have never succeeded.

With reference to these wounds of the face, there are yet some other interesting considerations. The integuments and soft parts, at certain points, are supported on an osseous structure that is prominent and expanded, so as to form between its tables a certain hollow space or sinus. This is lined with a mucous membrane, continued from the great internal surface of the body. Now it sometimes happens that in wounds of the face, not only are the external parts injured, but the instrument penetrates into one of these cavities. If, in such a case, the surgeon is not very careful to bring the lips of the wound closely together, and particularly if any small spiculæ of bone be left in the bottom of the wound, a *mucous fistula* is apt to result. This exposes the patient to extreme inconvenience, from the continual flow of mucus over the face. It sometimes results from a wound penetrating the nostrils, which fails to unite in like manner as in the other case. This condition is often very difficult of cure. I have seen some very obstinate cases, particularly as affecting the antrum maxillare. There is a perpetual and annoying drain from the sinus, and the parts around in time contract and adhere to the bone, leaving a round hole through which the trickling mucus drips. The mucous surface is thus exposed to all the changes of the atmosphere, and its secreting functions are, in all probability, excited to increased action.

The most rational proceeding in such a case is to establish, in the first place, a free communication between the sinus and the nasal orifice, and then to obliterate the fistula by dissecting up the parts around the orifice, stretching them in order to cover the opening entirely, and stitching the flaps so closely together, that no leakage can take place. If you can get this wound to unite entirely, you will succeed in relieving your patient of his annoying infirmity; but unfortunately this is not always the case. Again: there may be no failure of union in the soft parts, but from the effects of the injury, inflammation, may arise in the antrum maxillare, (or antrum *Highmorianum*, as it is sometimes called) and as a result of this inflammation, the passage from it to the nose becomes closed. It thus becomes necessary to establish an orifice into either the nose or the mouth. The simplest plan, though it is not always practicable, is to dilate the natural opening. If unable to do this, you will be obliged to make an opening into the mouth, or even sometimes to dissect up the cheek, and apply the trephine to evacuate the accumulated fluids.

I believe that these are the principal subjects, which it is necessary for me to discuss in this connection. The accidents and affections of the *lips* will be considered when we discuss the subject of hare-lip.

LECTURE LIV.

AFFECTIONS, ETC., OF THE NOSE—OZENA SCROFULOSA AND OZENA SYPHILITICA—TREATMENT—POLYPUS TUMORS—TREATMENT.

I shall, to-day, direct your attention to the nasal fossa. You will find it lined by a peculiar mucous coat, which has received the name of the *Schneiderian membrane.* This membrane, under certain circumstances, and particularly under the influences of peculiar diathesis of the constitution, is exceedingly liable to the development of certain pathological conditions. Of its simple inflammatory affection, coryza, it is not in my province to speak. But its inflammation may give rise, in the first place, to suppuration and ulceration, under several modifications, according to certain peculiar influences, or certain *specific causes.* It will be unnecessary to enter into a discussion of all these modifications; and we will therefore confine our attention to those which fall directly under the treatment of the surgeon.

You will often be consulted, especially by those of a scrofulous constitution, for an offensive discharge from the nostrils, which, in some cases, has existed for a considerable length of time. This condition is called *ozena.* It may depend upon two principal and different causes, and therefore should be considered under two heads. The *scrofulous diathesis* is, in some instances, its cause; while, in other cases, the origin may be traced to *syphilitic contamination.* Hence we have ozena *scrofulosa,* and ozena *syphilitica.* There may be other causes; but I mention these two as the principal conditions of the constitution, which *generally* prove to be the origin of the affection.

Whenever we have an opportunity of observing the mode of origin of this kind of ulceration, we find, that before the ulcer is formed, certain changes on the surface of the membrane may be noticed. We find that, at first, the isolated follicles of the part become red and slightly elevated, showing a turgid state of the capillary vessels. This condition may remain for some time unchanged, occupying a greater or less extent of the membrane. These isolated follicles, in time, however, become separate points of ulceration, which subsequently run into each other, and form an irregular ulcer of greater or less extent. It frequently happens, that in time the bones become affected; and this is especially the case with respect to the ossa *spongiosa.* They are endowed with such a low degree of vital power, that under these circumstances, this "ozena" is apt to lead to a tedious and protracted exfoliation of portions of these bones; and, in some cases, even to necrosis of the whole of one of them, which is thus sometimes discharged entire. The peculiar fœtid odor often perceived, arises from the fact of the disease having extended to the bone.

Thus far, I have considered the affection as confined to the lining membrane of the nose, and the structures on which this organ rests. In the preceding lecture, I have referred to the fact, that this membrane was continuous with that lining the various fossæ or sinuses, in connection with the nose. Now, owing to this continuity of surface, the disease under consideration not unfrequently extends into these sinuses; or it may, under other circumstances, extend *to* the nasal fossæ, from its *origin* in one of these. When thus originating, it is, as you may suppose, by far less manageable, as it is shut up and out of our reach. In the *frontal* sinus, for example, we have no means of getting at the affected spot, and, consequently, our local remedies have to be abandoned. It sometimes happens, that, in addition to the fœtid discharge from the disease, an exudation of plasma takes place, which concretes on the surface, and forms thick, hard scabs on the ulcer. These are sometimes so firm, and adhere with such tenacity to the diseased surface, as to resemble a horny excrescence. They are thrown off from time to time, however; and the ulcer is then exposed, which is sore, red, and of an unhealthy appearance. The disease may thus continue, until even the spongy portions of the ethmoid and the nasal bones become affected; and in some cases, it is ultimately transmitted to the base of the brain, and causes death.

This "ozena," then, is not merely an offensive and exceedingly disagreeable affection, but may even involve the safety of the patient; and I will in addition remark, that in the whole nosological table, you will be unable to find a disease so apparently insignificant, and yet so refractory under *treatment*. After weeks of treatment, you will frequently find that you have done but little good. You should not, however, abandon the case on this account. It will be your duty, guided by proper indications, to try remedy after remedy as they fail.

To enter into lengthy details concerning the particular *treatment*, would be too great a sacrifice of time. All that I can do, therefore, is to lay down the general principles for your guidance. I have mentioned that the disease depends upon some one of the *diathesis*, or constitutional affections. I would only say, that such remedies as are appropriate to the particular constitutional malady, should not be omitted. In ozena *scrofulosa,* you should resort to the remedies for the scrofulous diathesis: in the syphilitic form of the disease, you should endeavor to counteract the general contamination of the system, by using the appropriate remedies. The various preparations of mercury, iodine, arsenic, &c., may be tried in succession. But besides this constitutional treatment, it will be advisable, in both ozena syphilitica, and ozena scrofulosa—and, in fact, in all forms of the disease—to resort to local measures. Bland mucilaginous injections should be used, to keep the parts clean; which should, by this means, be washed at least two or three times during the day. Any mild, soothing liquid may be employed. Simple soap and water will answer the purpose very well. But this is not all of the local treatment. As the ulcer is always of an indolent, unhealthy character, it is necessary to resort to stimulating applications. These applications have been infinitely varied. Both stimulating and disinfecting lotions are of service. You may use solution of chloride of soda or lime, or of chloride of zinc; a mixture of creosote and water, or a weak solution of pyroligneous acid. Having arranged the strength of the agent chosen, in accordance with the patient's capacity of enduring it, you must take a small syringe, and, filling it with the liquid, inject the latter into the nostril in such a manner as to wash the whole lining membrane of the part. The practice resorted to by some, of limiting the application to the surface involved, is not in my opinion sufficient. In addition to the above, I may mention the solutions of corrosive sublimate, and sulphate of copper, and the dilute mineral acids, as having been used with alleged advantage. The dilute mineral acids are particularly useful when necrosis has resulted. They dissolve the earthy constituents of the necrosed portions of bone, and hasten their discharge. Again: instead of injecting a liquid, you may obtain the same benefit by blowing some stimulating powder against the part. Sulphate of zinc or copper, calomel, cinnabar, &c., offer themselves for your choice. Their strength should be lessened with sugar to suit each case. They may be taken as snuff is commonly used, or they may be blown into the nostril by another person, with the aid of a quill. Fumigations, particularly of mercury, may also be resorted to with advantage. Their benefit is not confined to the syphilitic cases; but they will be found to do good in those of a scrofulous character also.

Such, then, is a summary of the means I would recommend you to employ, in the treatment of the different varieties of ozena. But, as I have already remarked, you will find the disease exceedingly refractory; and you will frequently be disappointed in its management. My plan is, to vary the agents employed, as in the treatment of ulcers elsewhere; not that the indications of treatment change, but merely to try the different means in our hands for fulfilling those indications. In fact, you must act towards the affection as you would to a spoilt child; you would vary your management very freely. It will be necessary in some cases to carry the treatment on even for years.

You may think, gentlemen, that I have dwelt unduly upon this affection of the Schneiderian membrane; but I have been so situated, as to have been very frequently consulted for the disease, and I have frequently failed to effect a prompt and perfect cure.

But to proceed: there sometimes springs from this mucous membrane, a soft and gelatinous, or a fibrous mass, which, from its fancied resemblance to a polyp, has received the title of a *polypous tumor*. It is a kind of adventitious growth, which protrudes from the membrane, blocks up the cavity, and even sometimes extends to the fauces. It may arise from any point of the mucous surface under consideration. As a general rule, those tumors of this character which arise from the septum and vault of the nose, are apt to be of the *fibrous* texture; while, on the other hand, those that spring from the external sides of the nasal fossæ, from the turbinated bones, and particularly from the deep fossa between these bones, are more prone to exhibit a *mucilaginous* consistence.

When one of these tumors has once formed, it gradually undergoes an increase in size. Its growth is more rapid in damp weather—it is *hygrometric*. After a time, if it is not removed or excised, it will entirely fill the nasal cavity; and then it may protrude and become conspicuous at the anterior nostril, or it may hang down behind the uvula, producing by its presence there an incessant and annoying cough. Cases have been recorded, in which the polypus has been swallowed and puked up by the sufferer. J. Bell describes a most interesting case of this kind. But this is not all. The tumor may expand laterally; may take possession of the antrum Highmorianum, and, filling it entirely, may, in process of time, so encroach upon its exterior wall, as to produce a most hideous deformity of the cheek. By developing itself downwards, it may press down the hard palatine floor of the nose; by developing itself in an upward direction, it may press up the floor of the orbit, causing the ball of the eye to protrude to a greater or less extent; and in process of time, if the patient be not relieved, it may produce so much constitutional disturbance, as even to threaten his life. Nor are these, even, the sum of the consequences which may result. A polypous tumor, though not itself of malignant growth, from the great impairment of the vital powers, may *give rise to* a development of a malignant character; a polypus may degenerate into a cancer. It becomes more vascular and ulcerates; and thus you have an instance of a disease which is simple and manageable at first, but which, if not then arrested, may lead to the most disastrous consequences.

The *treatment*, then, of this affection, should be a matter of early attention. If the disease is seen in its first stages, it is in your power, in almost all cases, to arrest it, even without resorting to an operation. Some of the dry, stimulating powders, or a solution of sulphate of zinc, or sulphate of copper and alum, will generally effect a cure, if used in time. I have known a case, in which an infusion of the common peach leaf was successful. I do not mention this case to lead you to believe that I rest much confidence in the supposed powers of this simple agent, but that I may impress on your mind, that, if the disease is attacked early, the simplest agents may arrest its progress, and even cure it. In this case, the polypus had been torn out several times by the forceps.

Unfortunately, however, we seldom see the disease in this early stage of its progress. When the tumor has enlarged, so as to encroach upon the parts around, we are constrained to resort to other measures. It becomes our duty now to remove it. We may resort to three methods of doing this. We may tear it away with the polypus forceps; we may cut it off with a bistoury; or we may destroy it with a ligature. In most cases I have found the first method perfectly successful. Placing the patient in a strong light, with his head thrown back, take a pair of polypus forceps, and, grasping the tumor with it, as near to its root as possible, tear off as much as you are able. When it is of the fibrous character, hard and resisting, it will often be necessary to twist the forceps, before it can be removed. It often happens, particularly when the texture of the tumor is soft, that only a part comes out with the forceps. In such cases, it will be necessary to grasp it again and again, as often as is necessary to remove the whole. You must, however, bear in mind that in these efforts you may injure the delicate turbinated bones, and you should therefore be careful not to exert too great force in the operation. Sometimes a startling hemorrhage will burst out after the operation; but it will generally cease in a short time; although, in some rare instances, it may be so profuse as to threaten the patient's life, sometimes even, before the operation is completed. In such cases, it will, of course, be necessary to stop, to plug up the anterior and posterior nares, and to resume the operative proceedings after the hemorrhage has been arrested.

Although, as I have above remarked, the forceps will succeed in a majority of cases, you will meet with some tumors of the fibrous character, which are so firm and unyielding, and which adhere with such tenacity to the parts on which they rest, as to threaten considerable injury to the healthy structures, should you attempt to tear them off. In such cases, you may resort to the knife. Make the patient blow his nose forcibly, so as to expose as much of the tumor as possible. Then catch it with a vulsellum, and passing a probe-pointed bistoury, with a long, narrow blade, up to the bone, cut it off as near as possible to its origin. Sometimes you can cut off but a part, and in such cases repeat the operation, till you have removed the whole, piece by piece.

The third plan for the removal of these tumors is the resort to the application of a ligature. The plan recommended is, to take a double canula, such as may be found in almost all pocket cases, and pass a loop of wire through its end. This is to be passed into the nostril, when, by dexterous manipulation, you may succeed in getting the tumor to fall into the loop. If the tumor is small, you may at once stop its circulation, and strangulate it; but if it is large, the process should be more gradual; you should not go so far, as entirely to cut off the circulation at first, but you should do it gradually, by increasing the compression daily. From the various plates which have been executed to show the manner of noosing these polypi, you might be led to regard it as quite an easy operation. But, when you bring your common sense to bear upon all the circumstances attending its performance—the narrowness of the cavity, the difficulty of seeing what you are about, &c., &c.,—you will agree with me, that this noosing of polypi in the nose is an expedient which has arisen in the closet of the surgeon, rather than on the operation table of the hospital; and that practical results can but seldom be obtained from its adoption.

Whether removed by one method or another, there is a great tendency for the the polypus to return; and it is necessary to apply some local agent, that will change the action of the part from which the tumor sprung. The best agent for this purpose is the common caustic, or the nitrate of silver. It will sometimes be possible to see the point of origin; when a crayon of the caustic may be applied directly to the part. In other cases, it will be necessary to use a speculum.

In some very rare instances it becomes necessary for the removal of nasal polypi, to resort to a far more severe operation than any I have yet detailed. The disease may be so situated, as to be entirely out of our reach by any of the preceding methods; or it may extend out of the nose, and so fill its cavity as to leave no room for the operative proceedings necessary. In such cases it will be necessary to lay open the nostril, by a longitudinal incision; to dissect up, and turn back, a flap of the integuments; with the bone-shears to cut through the nasal bone, and the nasal plate of the superior maxillary; to tear or cut the polypus from its origin; and to apply the caustic freely over the surface of its previous adhesion. Such is a hasty summary of the operative proceeding in such cases. It is seldom, however—I am glad to be able to inform you—that we are obliged to resort to such a severe expedient for the cure of this affection.*

---

*HEMORRHAGE FROM THE NOSTRILS.

Epistaxis is an affection of very frequent occurrence, and perhaps there is not one in the catalogue of diseases, that varies so much in the degree of its violence. Two distinct forms of hemorrhage from the nostrils are generally recognized by surgeons, *the active, and passive.* The first is generally accompanied by symptoms of local congestion; as heat and fullness of the Schneiderian membrane, with fullness of the head, &c.; and generally results from injury, or some peculiar predisposition. The second appears rather to depend on some unhealthy action, by which the relative condition of the blood and mucous membrane of the part is changed. This form of the affection, generally follows some severe and prostrating illness. The best treatment in the active form, will consist in cold applications over the nose and head: ice or cold water are perhaps the most convenient, and will generally succeed.

Much discussion has been expended upon the propriety of general bleeding, as a remedy in these hemorrhages. There can be very little doubt that in severe cases of active epistaxis, particularly when the hemorrhage appears to take the place of some other discharge, to which the system has been accustomed, and

LECTURE LV.

SMALL OPERATIONS ABOUT THE FACE—CORRECTION OF DEFORMITIES OF NOSE—OPERATION FOR ENTROPIUM—PTOSIS—ECTROPIUM—HARE-LIP.

We design this morning, gentlemen, to demonstrate, as far as is practicable, the small operations about the face. Some of these are designed for the correction of certain pathological conditions, and some for the relief of deformity from a loss of substance.

The first which I shall mention is one for the remedy of deformity in the nose. This operation is modified according as we wish to remedy a mere *want of substance* in the nose, or as we design to make an *entirely new* one. We all possess a sufficient degree of personal vanity, to make us desirous to avoid a disagreeably conspicuous appearance; and while the operations of which I am about to speak, may not occupy a high position in the way of saving human life, or alleviating its suffering, they certainly do occupy a very high position as the means of relieving much moral pain.

As the *general principles* of surgery are more especially the objects of this course, I shall be obliged to confine myself to an explanation of only the more prominent of these operations.

In these plastic operations there are, in the first place, a few

---

which has been suddenly checked, blood-letting may do good. But under other circumstances, where V. S. would be well borne, it appears to be quite unnecessary, for the same that would be drawn from the arm, will do no harm if permitted to flow from the nose, and will generally be followed by relief. Where the hemorrhage is of a passive kind, blood-letting is out of the question, and we must rely entirely on the local use of cold, &c., as above.

In both forms of hemorrhage, if the local application of cold fails to give relief, astringents may be resorted to, either in the form of a fine powder, blown through a tube into the nostril, or as solutions thrown in by injection; a strong solution of alum is perhaps under ordinary circumstances, the best preparation. I have used it to great advantage, of the strength of thirty grains to the ounce of water.

If these measures fail, direct pressure has been recommended. A probe, slightly bent at the end, thin and flexible, should be guarded by a canula, passed through the nostril, until its point can be reached in the throat; and it should then be drawn forward in the mouth sufficiently to attach a piece of soft lint or sponge—previously moistened in some cold astringent liquid—thereto. The probe is then retracted, and the plug fixed firmly in the posterior nares. All that then remains to be done is to stuff the anterior opening with lint, or some soft substance, and the tube will be completely closed, and further hemorrhage will be impossible. This operation is, however, but seldom necessary, as a piece of lint or sponge, general principles which are always to be borne in mind. The first of these principles has reference to the condition of the part used in repairing the injury, and to that of the part to be repaired. For example; should the loss of substance result from a syphilitic injury, it would be unreasonable to suppose that the operation would be attended with success, while the constitutional evil remains the same.

Again: there has been considerable difference as regards the point from which the part to repair the loss should be taken. Notwithstanding all the tales of transplantation of human tissue which have been published, we do not, at the present day, act upon that principle; but in performing these operations, we use the parts of structure in the immediate neighborhood. Sometimes we accomplish our object by merely gliding the flap into the desired position, and sometimes by turning it round, and leaving it temporarily attached to its former position by a peduncle.

But we have one more general principle to impress on your memory, before we proceed to particulars. As you must be aware' there is in every citratrix, a constitutional tendency to corrugate and contract. You should always, therefore, in dissecting your flap, be careful to make it large enough to allow for this contraction. It should be *larger* than the surface to be covered.

As regards the operation for the improvement of the nose, there are, at the present day, two plans of procedure. In one of these plans the flap is taken from the cheek or fore-head; in the other,

---

moistened in some astringent solution and applied directly with a probe, will nearly always succeed. M. Negrier, of France, advises that the arms of the patient should be carried suddenly above the head, and held straight upwards, being kept in that position some time. This simple method is said seldom to fail. Professor Wood states that pressure upon the upper lip will often succeed, by closing the small artery that there courses towards the septum.

Though generally a mild affection, stopping very soon and even without treatment, causing the loss of only a drop or two of blood, this hemorrhage sometimes proceeds to an alarming extent, nay, has more than once caused death. Epistaxis, therefore, should never be neglected, particularly when of the passive form; but it should, unless a good reason exists for letting it alone, be stopped as soon as possible.

It sometimes happens that this affection coming on at night, the sufferer swallows the blood, and on awaking alarms himself and his friends, by apparently spitting or vomiting blood. This is particularly apt to occur with children, and may mask the nature of the complaint. A close investigation of the history of the case, with a careful examination of the nostrils, will render a mistake impossible. Most frequently the hemorrhage occurs from one nostril only at a time; this, however, is not always the case.—T. S. W.

it is taken from the arm. The latter plan is exceedingly inconvenient to the patient, from the constrained and uneasy position in which it is necessary that his arm should be kept. On this account, this plan is now but seldom pursued; and my remarks will relate exclusively to the other method.

The most simple, and also the most frequent deformity of the nose, is that condition in which there is a defect in one of the alæ. To relieve this, we prune the edge of the ala nasi affected; we dissect up a portion of the integument of the cheek adjacent, corresponding in size to the extent of the deformity, with a due allowance for contraction; and we turn this on its peduncle, into the defective part, applying the raw surfaces together, and retaining them in apposition by sutures. By this plan, you perceive, we form the alæ of the nose, and in a great measure correct the deformity. The operation is to be completed, by bringing together the edges of the wound from which the flap has been taken, and by promoting their immediate union, by sutures if necessary.

In cases of still greater deformity, but in which only one side of the nose is wanting in its regular contour, we perform a different operation. We will suppose a case, in which almost the whole of one side is defective, and in which the septum is also wanting. Here we make a flap, cut with a projecting point for the continuation of the septum down to the lip. Of course this projecting point in the flap should be on the side in which, when it is placed on the side of the nose, it will correspond to the median line.

We do not intend to show all the different operations for the various degrees of deformity to the nose, and therefore we will now proceed to say a few words in explanation of the method generally adopted in forming a new one, when the whole organ is deficient. We propose to show you how we make a *surgical* nose.

We take a flap from the forehead, shaped almost precisely like the figure of the ace of spades in the ordinary playing cards. The projection on the *upper* part of the flap, when the latter is turned round, and twisted downwards, will fall into the natural position of the septum. The peduncle at the *lower* part of the flap should be cut with a certain degree of obliquity, to admit the more readily of its being twisted round, so that the raw surfaces may meet. The peduncle should be of sufficient size to sustain the vitality of the part, and you should be careful not to make the plan too small. It should be *larger* than the surface to be covered. If it proves too large, it may be reduced by an elliptical incision. Thus, too, you can modify the shape of the nose to suit the taste of the patient. You may make him a Grecian or a Roman nose, or even an Ethiopean one, if desired. In order to prevent the nose from falling too low down, it will be well to insert into each nostril a dossil of lint, and a tube to admit of the passage of the air. These should remain until the parts are healed. After the lapse of a week or so, when union of the parts has taken place, it becomes necessary to divide the peduncle of the former flap of integuments, and even sometimes to cut out a portion of it, in order to remove the deformity consequent upon the twisting of the same. But we must go back to the adjustment of the flap, for the operative proceedings are not finished at that adjustment. In order to obviate the deformity which would result from the formation of a large scar over the surface from which the flap was stolen, we must do something. The *mark* will always remain, but by reducing it merely to a linear cicatrix, its appearance is rendered much less unsightly. This is to be accomplished by dissecting up the edges of the wound, stretching them to meet each other, and securing them in contact.

This operation is an easy one, and involves no hazard; but those who think they can form a decent nose very speedily, are much mistaken as to their skill. To make a rough, rude nose, is perhaps quite easy; but to make a *fine* nose is very difficult; and it requires that the patient should submit himself to a long process of modelling and trimming, before he can show one that he need not blush to own.

Sometimes there is a deficiency only at the tip of the nose; in which case the deformity may be cured by means of a flap taken from the dorsum, the wound thus formed being treated for union in a linear direction, as in the other cases.

When only the septum is deficient, two plans of operating have been resorted to. By one plan, the part is supplied by taking a square piece from the upper lip through the whole extent of its thickness; by the other, the flap is taken from between the thumb and the index finger, the hand being strapped to the face until union has taken place. When the first plan is pursued, the wound in the lip is treated as a case of hare-lip.

But to proceed. It is sometimes necessary to repair the *eyelids*, especially if the ball of the eye is exposed. If the deficiency is of small extent, it may be supplied by means of a flap from the temple, if the upper lid is the one involved, and from the cheek if it is for the lower lid. As much of the tarsal cartilage should be preserved as possible, in paring the lid for the reception of the flap. We can even remedy the more extensive deformities of the eyelid in this way; and by using the integument of the forehead, we can form an entirely new upper lid. The first step in the operation for the accomplishment of this object is, to remove, by a triangular incision, all hardened or diseased structures over the eye, leaving the surface raw. Then we cut a triangular flap from the forehead, of the requisite size, (allowing for contraction,) and turn it into the position of the eyelid. The triangular wound thus formed is made into a square, by cutting off a corner of integument, and its edges are then approximated, and sewed together.

The principal difficulty in an eyelid formed by this autoplastic operation, consists in the absence of a tarsal cartilage, and of the ciliæ or lashes. The result of the want of this cartilage will be either the eversion or inversion of the lid, with the consequent annoyances to the patient. Such a state of the part is far preferable, however, to the exposed condition of the globe of the eye, for which the operation was undertaken.

We very frequently meet with two diseases of structure, or deformities, of both the upper and the lower eyelid. In the one, the edge of the lid is turned in, and the affection is then called *entropium;* in the other it is turned out, and the deformity goes by the name *ectropium.* When either of these conditions obtain, it is a matter of great annoyance; from the irritation of the ciliæ to the eyeball in one case, and from the exposed, and consequently the dry condition of the conjunctiva in the other.

The condition first mentioned can often, in its milder forms, be remedied by a very simple operation. All that is necessary is, to seize, with a pair of forceps, a small elliptical portion of the integument of the lid, and swipe it off with a curved pair of scissors. The edges of the wound thus made, are to be retained in juxtaposition by the aid of fine needles; and by this means, the edge of the lid is turned out sufficiently to free the eyelashes. If the entropium is very slight, it may even be cured without resorting to the knife, by means of an escharotic. Concentrated sulphuric acid, for example, applied with a wooden brush, in a line transversely over the lid, will, by causing the formation of a slough, produce sufficient contraction of the outer surface of the lid to cure the affection.

There is another condition of the upper lid, which I may mention here. Owing to a want of power in the *levator palpebræ* muscle, or to a general flaccid condition of the parts, the patient is unable to raise the lid. He cannot open his eye. The affection is called *ptosis;* and it may be remedied by the use of an escharotic, or by resorting to the knife, as for entropium.

For the relief of *severe* cases of *entropium*, two principal expedients have been recommended. The first plan is, to make two lateral perpendicular incisions on the lid, and then to apply the sutures upwards, to draw the lid out. The other and better plan is, to make two incisions, including a triangle; one on the external angle of the lid, and the other on the internal. The point of this triangle is to run towards the upper edge of the lid, and it is to be dissected up to the lower edge of the lid. A greater or less portion of the free sides of the triangular flap being then sliced off, the remaining portion of the flap is to be drawn up to the edges of the wound, and there secured. Thus, the lower edge of the lid is drawn round by the shortening of the flaps, and the affection is cured, or ameliorated. This plan is also applicable to entropium of the lower lid.

For the cure of the opposite condition, or *ectropium*, in which the edge of the lid is turned *out*, a variety of expedients have been recommended. It has been proposed—first by Paulus Ægineta—simply to cut out of the everted surface a portion of the shape of the letter V, and to approximate the cut edges, and retain them in apposition, as in hare-lip. This operation may sometimes succeed; but in by far the majority of cases, it will fail; and we are then obliged to resort to one of the more effectual plans. You may succeed by cutting out a portion of the conjunctiva in the form of an elipse, and passing sutures through the everted membrane and through the lid, thus drawing the former in. If the affection is dependant on a diseased condition of the lid, and particularly if it is accompanied by a hardening of the tarsal cartilage, you may meet with some success by resorting to the operation for the formation of a new lid. But as I cannot enter into particulars of a less practical character, and as you will always have time to prepare yourself for these cases, I must refer you to your books for a better acquaintance with this subject.

We have sometimes to remedy deformities of the *lips*, and more especially of the upper lip. The deformities leading to this demand upon our science, are either accidental or congenital.

By the *congenital* deformity, we mean that condition which is found to exist at birth, and which is called *hare-lip.* In some such cases, we find the deformity to consist in a single cleft of the lip; while in others we have a projection of bone in the centre, with one of the incisor teeth, and a double cleft of the lip. In a case of the former kind, the operation for the relief of the deformity is quite simple. It consists in paring off the edges of the cleft, by means of a wedge-like incision, and applying the proper sutures to retain them in apposition. But when the cleft is double, as it is of importance to save the middle portion, we must pare off the edges of that also, and bring the *four* raw surfaces together, by means of sutures passing through this middle portion. It is best, in these cases, to dissect up the lip from its adhesions (if there are any) with the upper jaw. The coronary artery will sometimes require torsion, or ligation.

In securing the contact of the parts, the twisted suture should be used; and for this purpose, the German pins will be found very useful. Being very slender, they inflict little injury; and they are not so prone to leave a scar. Two of them will generally suffice, though sometimes it may be necessary to use a third. You should be careful to endeavor to secure the natural projection of the lip, by giving a slight obliquity to the incisions, by passing the upper pin obliquely upwards and backwards, and by so adjusting the lower pin as to secure perfect contact at the lower edge. Otherwise, when the parts are healed, a fissure on depression will be found, where the rounded projection should be. You should also be careful to cut off the edges of the cleft or clefts, so as to secure a uniformly raw surface. I have known cases, in which, from the neglect of this particular, it has become necessary to repeat the operation. In the double cleft, especially, both parts should be *thoroughly* pared off, and the pins should be passed entirely through. If there are any teeth in the way, they must be extracted, and if there is much projection of bone, it must be clipped off with the bone shears. In cases of very extensive clefts, it will be necessary, sometimes, to make lateral incisions in the cheek to admit of the approximation of the parts, the edges of such incisions to be united in a linear direction, by stretching the surrounding integuments, as has already been directed in cases where similar proceedings were recommended.

LECTURE LVI.

OPERATIONS ABOUT LOWER LIP AND CHEEK—ABOUT THE MOUTH—FOR RELIEF OF IMMOVABLE JAW—EXCISION OF PORTION OF THE SUPERIOR MAXILLARY BONE.

At our last lecture, gentlemen, we spoke, as you will remember, of hare-lip, one of the deformities of the *upper* lip. Now, descending to the lower lip, we find that this is more liable to surgical operations; not, it is true, from any congenital deformity, but because it is more liable to suffer from various pathological conditions. The first of these that I shall mention, may either be congenital or acquired. It is a kind of *ectropium* of the lower lip, and is the cause of great inconvenience; not from any serious danger, but from the continual draining away of the saliva. When this deformity becomes a cause of serious incovenience, it is the duty of the surgeon to afford some relief; and I apprehend that the easiest way of effecting this object is to begin an incision at each angle of the mouth, and carry both of them obliquely towards the centre of the chin, prolonging them until they meet; then make an incision from the centre of the lip directly to the point of the chin; remove a V like portion; dissect back the skin on each side, and bring the edges together by suture.

Again; we sometimes find, both in the upper and lower lip, a great deformity, consisting in the lips presenting a kind of double margin. This may be congenital, or may be caused by a kind of hypertrophy of the substance of the lip; and where it gives rise to great deformity, or produces much inconvenience, it may become necessary to remedy it. This is done by carrying an incision from one angle of the mouth to the other, cutting in the depression existing between the folds; by truncating this by a transvere incision; and, by bringing the edges, of the skin on the outer and of the mucous membrane on the inner side, into neat apposition. But it sometimes happens, that from the ravages of disease, or from some accident, the greater part, or the whole of the lip is lost. Then it becomes necessary to repair or *re*-form it. Where there is a cancerous degeneration, it becomes necessary to remove the tumor. When it is not of great extent, all that is necessary is to include the tumor in a V shaped incision, taking care always that the knife should pass through healthy structures. You will have no hemorrhage to fear; for though the inferior labial artery will bleed, it may be easily ligated, or as is generally the case, simple torsion is all that will be necessary. From the yielding nature of the integuments of the cheek, the wound is easily closed; and the edges being nicely brought together, it is to be treated as a hare-lip. But unfortunately, it sometimes happens that it becomes necessary to remove the entire lip, and notwithstanding the yielding nature of the integuments, they cannot be made to supply the deficiency. Here, then, we must modify our operation, somewhat in the following manner. Sometimes we may have to extend our incisions even beyond the mouth. We first remove, by a V shaped incision, all the diseased parts; and having gone thus far, and arrested any hemorrhage which may have occurred, we next pass a finger in the mouth, between the alveoli and the cheek, and continuing the incision transversely across the cheek from the angle of the mouth, we cut carefully through the structures to the mucous membrane of the buccal cavity, carefully preserving this, with a thin layer of cellular tissue. We repeat, on the opposite side, the same steps, afterwards dividing the mucous membrane on a level with the upper edge of the incision, so that the thin flap thus formed being turned outwardly, and stitched to the skin along the lower edge of the incision, may be made to form a natural covering for that part which is to enter into the formation of the new lip. The edges of the wound are then to be brought together.

In many cases, where the loss of structure is very great, we fail entirely in bringing the edges of the wound together. Then the next step is to dissect up the integuments of the cheek from the jaw, until you can approximate the edges; and if this be not sufficient, we can make two lateral incisions through the integuments of the cheek, either straight or semi-circular. We may thus be enabled to approximate the edges. Now, it is very true that in this latter case, we leave our patient the deformity of two lateral linear cicatrices, in addition to the middle one; but the appearance, on the whole, is improved. I would state, that where the disease assumes another form, and involves the structures about the chin, instead of a V shaped incision, two vertical straight parallel ones should be made; and if the integuments of the chin are sound, we should save them by a transverse incision above them, and then bring the edges of the wound together as before. By various modifications of these operations, we can remedy the various deformites occurring from the loss of structure by cancer, sloughing, &c.

I would further remark, that those skilled in these operations have proposed various other expedients. But they are entirely unsuccessful: and especially is this true of that plan, which proposes to replace the lost part by a flap from the structures below the chin. I do not design to go into any discussion upon this subject. Time will not permit it. But I would say, that you may very well perform this operation; that your patient may have, for awhile, a very good lip, and be gratified by a look in his glass. But at the end of a month or so, the integuments having gradually contracted, the lip will be found already to have been drawn down to the chin, and the operation to have entirely failed. Such, also, will be the case with an operation of which I will speak presently.

There is another condition, affecting, generally, the substance of the cheek;—where cicatrices form after sloughs from mercury, or where there is contraction after burns. It here becomes desirable to remove the deformity; and this, fortunately, you can do. You should dissect out entirely the whole of the substance involved in the cicatrix; then dissect a flap from the neck, leaving a peduncle; turn it into its position, and secure it there with sutures.

There is yet another condition of great importance. It sometimes happens, that in consequence of peculiar modifying circumstances, the mouth becomes contracted, round, and so small as scarcely to admit the little finger. Now, at the first glance, it might appear very easy, by a simple transverse, linear incision, to remedy this deformity. But unfortunately the parts soon heal, and the mouth contracts as before. The method of proceeding in such a case is this:—Pass a finger or director into the mouth, between the alvolar processes and the cheek, and then, by a single transverse incision, enlarge the mouth sufficiently, taking care to preserve the mucous membrane to a sufficient extent to correspond with the thickness of the lip. Now, as mucous membranes will not, generally, adhere to each other, we avail ourselves of this circumstance to prevent the mouth from adhering, and contracting as before. This condition may have arisen from various circumstances. A mercurial slough, or lupus, may have caused it.

In this connection I will mention another condition of not unfrequent occurrence, especially in our country districts, in and through the whole length and breadth of which mercury is so universally, and, I fear in many instances, so detrimentally, used. This condition may involve not only the integuments of the cheek, but the deeper seated muscles, and even the bone. In these cases, we have not only deformity, but immobility also. This results from the strong adhesions that have formed, and from a change of structures in the muscles, giving rise to contractions, by which the jaws are held tightly together, the patient being then sustained by liquids only. It is important that the surgeon should here lend his aid to obtain relief; and fortunately it is in his power to do so to some effect. Our object is three-fold: first, to detach the cheek; secondly, to overcome the contraction by which the jaw is held; and thirdly, to prevent a relapse. As regards the first, the detaching of the cheek, it is easily effected by a simple dissection. The origin of this condition may be two-fold. It may result either from coagulable lymph having been thrown out, and having undergone its peculiar changes; or it may depend on some change in the structures of the muscles. It sometimes happens, in cases of slight adhesion, that by simply making use of pressure, applied against the alveolar processes, you can break up the connections. The instrument that I generally use for this purpose is a very simple one, consisting of two blades, united together by a hinge, and working with a screw. But when we have thus forced the jaw asunder, and thoroughly opened the mouth, were we to persuade ourselves that we had permanently succeeded, we should find, in less than a month, that we had really gained nothing. We should, then, place a cork between the teeth; pass the finger as far back as possible; search for those bonds of union by which the jaw is held, and, with a probe-pointed bistoury, divide them. By this expedient, you may even divide the masseter muscle, a performance which I have twice accomplished, notwithstanding its having been so much spoken of, of late, by two surgeons of New York, and its being by many others regarded as so difficult. Having thus divided the bands of union, it is necessary to put a cork, or some soft substance, between the jaws; to keep it there several days; and to make the patient move his jaws freely, until all danger of reunion is removed. I need scarcely remark, that when necrosis has taken place, you should not attempt the operation, until the necrosed portion of bone is thrown off, and the cicatrix has healed.

It frequently becomes necessary to remove one-half or the whole of the upper jaw on either side. The method of performing this operation that I adopt is, to carry an incision from the root of the nose along the median line to the mouth, and another to the corner of the eye; and then to dissect back one wing of the nose, the lower lid of the eye—saving the conjunctiva—and one-half of the upper lip, thus exposing one-half of the upper jaw.

The next step is to divide the bone. Having drawn out the incisor tooth, pass the bone shears, with one blade in the mouth, and cut through the floor of the nares, so as divide the alveoli and the whole extent of the bony palate, afterwards severing the velum with the scissors or bistoury. A second application of the instrument should then divide the nose up to its root. A third, directed transversely, severs the nasal process of the upper maxillary bone, and the inner wall of the orbit: while a fourth is made at the outer part of the orbit, generally through the spheno-maxillary fissure, which serves to detach the maxilla from the malar bone. This done, the diseased bone may be easily turned out of its situation; but in doing this, you must take care not to injure the ball of the eye. The injury to the eye is slight; and as regards the lachrymal passage, it is of no consequence; for, as the bone is removed, the tears flow readily into the mouth. The hemorrhage being arrested, either by ligature, or the actual cautery, the flap is turned back and carefully adjusted by means of sutures.

This method of extirpating the superior maxillary bone, originally proposed by Dieffenbach, of Berlin, is far superior to the ordinary procedure, in which the cheek is divided. It is more easy and expeditious, and leaves far less deformity of the face. I have practiced both methods, and can, as the result of experience, recommend that just described as far preferable to the other.

LECTURE LVII.

CASES FOR EXTIRPATION OR EXCISION OF PORTION OF SUPERIOR MAXILLARY BONE—TUMORS AND COLLECTIONS IN ANTRUM—THEIR REMOVAL AND CURE—NECROSIS OF WALL OF ANTRUM—DISEASES OF LOWER JAW—ITS EXCISION—IN WHOLE—IN PART.

In our last, gentlemen, we pointed out to you what we regarded as the best method of removing the superior maxillary bone, or a portion of it. It may be necessary, in this connection, to point out some of those circumstances which render it necessary to resort to this formidable operation. One of the most frequent is that degeneration known as *osteo-sarcoma.* There is here one circumstance, however, which I would impress particularly upon you. It is, that you should be very careful in your diagnosis. There is no part of the human body more liable to malignant degeneration than the upper maxillary bone. Particularly is it liable to encephaloid deposits; and in proportion as this deposit goes on, repeated hemorrhages break out, a bloody fungus shoots up, and you *may* perform the operation pointed out yesterday. But the question arises, would you benefit your patient, or in any degree relieve him by so doing? From my own experience I would reply, that you would rather render his condition worse. I say, therefore, be cautious in your diagnosis. I am free to confess that though I shrink from no operation, yet I would be very reluctant to submit my patient to this one for the relief of any malignant growth. I leave the subject to your judgment for determination, only stating to you, that the operation has, under these circumstances, been frequently performed, *but never with success.*

There are, however, some fungous formations in the antrum, which, from their very growth, may render an operation necessary. These are various in their characters. Sometimes they are vascular, or erectile. In their management you may choose between two expedients. Where the disease is of limited extent, and there is no breaking up of surrounding parts, you may succeed by opening the antrum at its external portion, and removing as much as possible of the tumor. You may check the hemorrhage, and at the same time produce a change of action in the part, by cauterizing the whole interior of the antrum with a hot iron.

This operation of opening the antrum is also applicable to many other pathological conditions, and, though somewhat out of place here, I shall mention some of them. Fibrous tumors sometimes spring up, and resemble very much what I have mentioned as osteo-sarcoma. But here there is no occasion for the removal of the bone. In most cases, by drawing back the angle of the mouth, and dissecting the cheek from the alveolar process; by opening into the antrum with a trephine, or Hey's saw and bone shares, and then by using the scalpel, curved scissors, &c., we can detach the tumor. So also with those tumors which are wholly of a soft consistence. Here, likewise, after cutting away as much as possible of the tumor, it will be necessary to apply the hot iron to the cut surface. When the tumor is very large, it may be necessary to carry an incision from the angle of the mouth obliquely upwards and backwards.

Again: we may have the antrum filled and distended with a thin watery fluid, or with pus, the natural outlet being closed. Now where you are sure that this is the case, you may open the antrum, by drawing the first molar tooth; and if the fang does not extend into the antrum, you may pass a trochar very easily from this point into the cavity. I set out, however, to enumerate the causes rendering an extirpation of the superior maxillary bone necessary, and have gone off to quite another subject. Nothing, however, has been lost by this, as it will prevent the trouble of returning hereafter to the subjects discussed in this connection. I will only add, that in addition to opening the antrum, it may be necessary to medicate its lining membrane by throwing in a solution of one of the salts of lead or of zinc. By keeping this treatment up, after the lapse of a short time, you will have the gratification of finding your patient perfectly cured.

You will sometimes find, that under certain circumstances, the inner surface of the bone becomes necrosed. Here will be formed a quantity of matter, and as long as this has free exit, you must not be in haste to extract the bony portions before they are loose.

As soon as any considerable portion is separated you will generally succeed in removing it, by drawing back the angle of the mouth, dissecting up the cheek, and seizing the loosened bone with the forceps. I can see no object in removing the diseased part, before it has become loosened. As soon, however, as any considerable portion is detached, we should remove the whole of the bone involved.

Before I go on to speak of the diseases of the maxillary bone, I will call your attention to a circumstance mentioned the other day, viz: that sometimes the duct of Steno being opened by an injury, the external wound will not heal, but forms itself into a fistulous orifice. The most simple method of cure, in such a case is, to pare off the edges, then taking a small trocar armed with lead wire, to pass it directly through the cheek from within outward, and then from without inward, thus including a considerable portion of the inner surface of the cheek. The object is to keep open an internal orifice, and to enable the external wound to heal by the first intention. This is effected by twisting the end of the wire together, and gradually tightening the twist until the wire cuts its way out internally.

The next subject of which we will speak is, the diseases of the lower jaw. The first of these which I shall mention, consists of a smooth round tumor called an *epulis*, springing from one of the alveoli. These tumors are generally small, but may enlarge and involve the whole mouth. They are of various degrees of consistency. Some are composed of cartilaginous substance, sometimes they are of a white homogeneous structure, and not usually they are of a malignant character. Sometimes, what was at first a simple fibrous tumor, becomes a bloody, malignant fungus. It should never, whatever be its nature, be allowed to go on, as the sooner the operation is performed, the easier it is, and the less is the loss of substance. Suppose, for example, there is one of these simple tumors near the angle of the lower jaw; without cutting the angle of the mouth we can draw back the lip, and ascertain the extent of bone to be removed, and, the teeth having been drawn, we can remove it by the knife, saw and shears. In some cases of osteo sarcoma, however, the diseased bone extends so far as to render necessary the excision of the part which is involved. And here I may remark, that we can remove a small portion, a half, or the entire bone, disarticulating it on both sides, and leaving the individual without any lower jaw at all.

Now, as regards the operation for excising a part or the whole of the lower jaw, it is proper for me to remark, that it is deemed one of the triumphs of modern surgery. In 1825 I had the opportunity of seeing the first individual upon whom this operation was performed, as far back as 1812, by Dupuytren. It was upon this occasion also, that I saw him perform his second operation; which consisted in dividing the lower lip with the scalpel, on the median line, from above downwards through its entire thickness, and continuing the incision as far down as the projection of the os hyoides.

The latter part of the incision should only extend through the skin and cellular tissue. Thus we form two flaps; which should be dissected back on either side, as far as the disease reaches, taking care to graze the bone so as to avoid the labial arteries. These flaps should be given to the assistant, and the operator should incise the periosteum on the bone at the spot where it is to be sawed, and extract the corresponding tooth on each side. Then, placing himself behind the patient, with a fine saw he should divide the bone, having guarded the upper lip and nose with a sheet of lead, paste-board, or something of the kind. Having separated the diseased bone, he should then grasp it in the left hand, from in front, carry a straight bistoury from below upwards, behind the bone, and separate the muscles from it, cutting near the bone, while an assistant presses the tongue aside with a spatula. It then only remains to tie the arteries, and bring the flaps together with sutures, leaving a small space at the inferior angle, to favor the escape of any pus that may be formed. Notwithstanding this operation is regarded as so serious, there is no surgeon engaged in a large practice, who has not again and again removed parts of the bone.

Where a part of the skin is to be removed, the original operation of Dupuytren will do very well; but I must confess I would prefer making an incision along the lower edge of the bone, and turning the flap up, so as to avoid the infliction of greater deformity than is necessary.

Where the lateral portion is to be removed, begin an incision below the lip, and extend it, in a curve whose convexity shall look downwards, to a point in front of the ear, on a level with the condyle. Then dissect the flap up, and turn it back upon the cheek; and next, protecting the cheek with a spatula, saw through the side of the bone. Then, using the saw as a kind of a lever, press the bone out; carry the knife along its internal margin, so as to avoid the artery; and enter the articulation from within, having previously cut off the coronoid process with the bone shears. As I have said before, you may use, for dividing the bone, either the bone shares or the saw. Or, as I have frequently done, you may combine the two. Whether you use the one or the other, you should previously draw the teeth at those portions of the bone, through which it is to be divided. The only artery which may detain you in the first steps of the operation is the facial. This, however, can be easily managed, either by ligature, or by an assistant's making pressure upon it. I was long accustomed to make an incision descending from the mouth, and through the lip, to the first incision. This, however, is unnecessary, as the curved incision of Mott exposes the surface of the whole bone, and avoids the duct of Steno. In this connection, I will state, that fibrous tumors sometimes form between the tables of the bone, without destroying the integrity of either. Here it will be unnecessary to remove the entire bone. Having removed the requisite portion of the jaw, you should draw the wound together, and treat it with cold water dressing. Thus you very frequently have the satisfaction of seeing the whole heal by the first intention. But to return to the subject of which I was speaking, fibrous tumors in the cancellated structure of the bone. Here the integrity of neither table is destroyed; and it is unnecessary to remove the bone. By means of a Hey's saw, &c., expose the tumor; turn it out from its bed; fill the cavity with lint; and heal the wound by granulation.

There is one point still to be mentioned in connection with this subject. By the removal of the angle of the chin, the muscle which keeps the tongue in its position may be cut through. The tongue instantly flies back; and the patient may be destroyed by suffocation. This result, however, is easily obviated by passing a ligature through the tongue, and tying it to a band passing around the neck.

LECTURE LVIII.

AFFECTIONS, OPERATIONS, &C., OF AND ABOUT THE TONSILS—HYPERTROPHY OF TONSIL—ITS TREATMENT—EXCISION OF TONSIL—ELONGATION OF UVULA—ITS TREATMENT—CLEFT—PALATE—TREATMENT.

You are aware, that on each side of the palate we have a glandular body, the *tonsil*. Of all the glands of the body this, perhaps, is most likely to take on certain changes of structure and size. It is very liable to *hypertrophy;* and when this change once begins, it often progresses with exceeding rapidity, and to a great extent. When the hypertrophy is considerable, as the organ is situated directly on the side of the fauces, the inconvenience to the patient is very great. His deglutition, his respiration, and his voice, are all affected; and, in children especially, the annoying habit of loud snoring is produced. It is my duty, then, to point out the best means of relieving this condition. The most simple plan (and this will often succeed of itself,) is the application of the nitrate of silver. The tongue being depressed, you should pass the point of a stick of the caustic to the gland, and keep it applied for some little while. This application should be repeated day after day, for some time, and under ordinary circumstances, especially if the hypertrophy is of recent origin, you will frequently succeed in reducing the gland to its natural size, or very nearly so. Other escarotics, or stimulants, may also be used. It may be touched with nitrate of mercury, or the undiluted tincture of iodine may be applied, taking care not to let this fall into the glottis, or upon the epiglottis.

But a more effectual method of treatment is, to make a few incisions into the gland with a probe-pointed bistoury, the organ being exposed and the tongue depressed, by means of a curved spatula. The operation will often be followed by a copious discharge of blood, which is mostly venous. A gargle, of cold water even, will generally suffice to stop the hemorrhage; and in a few days you will find that the gland has become greatly reduced, or you may only be able to discover a slight rising, as it appears in its natural condition. In making these incisions, and in performing the operation next to be described, (the excision of a portion of the gland) there is one important circumstance to be remembered. You are to bear in mind, that you are cutting directly towards the ***internal carotid artery***, and you should be careful not to injure it.

In some cases of tonsilar hypertrophy, when the swelling is caused by tuberculous deposit, and the gland is very much enlarged, neither of these methods will suffice for the relief of the patient, and it becomes necessary to resort to the operation of ***excision***. I do not mean excision of the whole body; for, situated as it is, an attempt to remove the whole gland would expose the operator to the imminent risk of wounding the internal carotid artery, which is here only separated from the gland by a thin layer of fascia. When, therefore, we speak of "excision of the tonsil," we only mean a slicing off of some of the superficial portions of the gland. This is a very simple operation; but like all simple operations, it may sometimes happen, that, from the anomalous distribution of the blood-vessels, or some other circumstance, it is accompanied by profuse, uncontrollable, even fatal hemorrhage; though, in such cases, death is produced rather by suffocation than by loss of blood.

Simple as this operation is, there is no other which has given greater room for the display of human ingenuity. Every species of instrument has been devised or adopted, to facilitate its performance. All of them, with the exception of the vulsellum, the bistoury, or a pair of curved scissors, I regard as superfluous. First, I will show you the instrument of Dr. Physic. It is, as you may perceive, a kind of ring with a concealed sliding blade. The tonsil being slipped into the curve, the blade is extended, and it cuts off the included portion. This instrument is very simple; but I have generally found, in using it, that on pushing the blade forward, the gland was pressed into the groove, and, the edge failing to divide it—it became necessary to detach the instrument, and to complete the operation with the curved scissors. Another inventor has added to this instrument, a sharp needle, which impales the gland, and working on a pivot, draws it still further out. But, in order to show you the progressive improvement in the art, I here exhibit a much more complicated tonsil clipper. It is that of Tiemann of New York. As you see, it is even provided with a spring, which catches the excised portion of the gland, and prevents it from falling into the throat.

I merely exhibit these instruments to you, as matters of curiosity. They are unnecessary to your surgical armory. It is true you may excise the tonsil with them. I have frequently done so. But it is an operation which I have had repeated occasions to perform, and I have come to the conclusion, that the best method to be pursued is that by the simple instruments I have mentioned. The common vulsellum, a kind of forceps armed with hooks, is to be made to seize the gland, by passing it back close to the teeth, and fixing it on the body of the gland; which may then be divided, either with the double curved scissors of Graefe, or with the common probe-pointed bistoury. The curve of the scissors removes the right hand from the line of vision, and is therefore an important peculiarity of the instrument.

In operating with the bistoury, it would be well to avoid the artery by cutting from below upwards, and then meeting the incision with one in the opposite direction. It is best, also, to refrain from cutting the *lower* portion of the gland. By these simple means, then, you can perform this operation much more easily, both to yourself and to your patient, than with any of the complicated apparatus I have shown you. A simple cold gargle will soon stop the hemorrhage, if it does not cease of itself.

You not unfrequently meet with an individual, who, from an inflammatory affection of the tonsil, which had extended to the uvula, has this *uvula* hanging preternaturally low. This may depend on a simple folding and relaxation of the mucous membrane, or it may be caused by a want of tone in the azygos, or levatores uvulæ muscles. When it hangs so low as to come in contact with the epiglottis, from its irritation to the sensitive surface of this part, a constant and annoying cough is excited. This irritation in time may lead, especially in those constitutions of a tuberculous tendency, to a serious affection of the larynx—*laryngeal phthisis*, or *laryngitis*. The irritation produced by this elongation of the uvula, is sometimes so great as even to cause violent vomiting. From these circumstances, it becomes necessary sometimes to excise a portion of this organ. It was for this purpose that Dr. Physic's instrument, which I have just shown you, was originally invented. I prefer, for this operation also, the vulsellum and scissors, to any other instrument. Seizing the end of the organ with the former, we draw it down, and cut it off with the scissors. The operation is simple, and hardly deserves a description.

The practice of thus shortening a uvula whose length is inconvenient, was not original with Dr. Physic, as has been affirmed, but was resorted to even by the Greeks. Dr. Physic, however, fully deserves the credit of reviving the practice in modern times, and of bringing it into general use.

In the next place, gentlemen, I will call your attention to a much graver subject, and to an operation much more difficult of execution. It sometimes happens that an individual comes into the world with a *cleft palate*, and a corresponding want of development in the palatine and superior maxillary bones, which leaves a cleft through the whole of the middle line of the bony palate, sometimes involving a separation also of the soft parts, and extending, in some instances, through the alveolar process, and it is then called *hare-lip*. When the communication is thus open between the mouth and the nasal cavities, the child is unable to suck, its deglutition is interfered with, and constant sneezing is excited.

Now, when this is the case, it becomes urgently necessary to do something for the relief of the patient. The operation to secure this relief, constitutes one of the most brilliant triumphs of modern surgery; not that it involves the risk of life; nor is it a brilliant operation from the celerity or the nicety of its performance, but because, by forming a partition between the nasal and buccal cavities, it perfectly relieves the patient from very serious difficulties and inconveniences. It consists, as in that for hare-lip, in first making two raw surfaces, by paring off the sides of the cleft; and secondly, in approximating these raw surfaces, and retaining them in apposition with each other. Of course the extent of the operation will vary, in accordance with the extent of the deformity. We place the patient on a chair, before a strong light—if a child, in the lap of an assistant—and insert a cork between his teeth. We then pass in a vulsellum or curved forceps, catch hold of the margin with it, and with a curved scissors, or with a probe-pointed bistoury, pare off its whole surface, leaving no single point of mucous membrane untouched. This is to be repeated on the other side, and then the patient may be allowed to rest a little. The next step will consist in passing the sutures. For this purpose, a multiplicity of instruments have been invented. You may use an instrument such as you see here, with a short needle—the segment of a circle—fixed in a groove. It is the instrument of Roux. The needles are to be passed from below upwards, on one side, and in a reverse direction on the other side. The thread is then to be tied, and an end of it is to be brought out at the mouth. As many of these ligatures should be passed as are necessary to secure an exact coaptation. The patient should then be placed in a position of perfect quiet; and he should not be allowed to utter a word for several days, and even then he should speak but little. He should refrain from eating or drinking as long as possible after the operation, and for some time should move his mouth with but slight exertion, only, indeed, moving it when necessity compels. The instrument will answer very well; but I now show you one which is somewhat more convenient. It consists, as you see, of a kind of ledge to pinch up the palate, and is provided with a concealed needle, whose end is to be seized with a forceps, after having been passed through. The rest of the proceeding is similarly conducted, as when the other instrument is used.

In some cases of this malformation, when the mucous membrane is adherent to the bone, and there is a large fissure between the bones, we experience far greater difficulty in effecting a cure, or even in alleviating the urgency of the symptoms. But although we cannot draw the bones together, we can generally succeed in covering the orifice with soft parts. We pare the edges as before; dissect up a flap on each side; and connect the edges with sutures as previously described. If the flaps cannot be approximated, an incision should be made on each side, parallel with the alveoli. It will sometimes be necessary to repeat the operation, until the part is stopped up entirely, or as nearly so as possible. If we fail in making a complete partition, considerable relief may still be obtained, by the use of what is called an *obturator*. It consists of two metallic plates, one to be placed above and one below, they being held in their places by the action of a key. This, forming a kind of partition, gives considerable relief, after the parts have become habituated to its presence.

LECTURE LIX.

DISEASES, OPERATIONS, ETC., ABOUT THE THROAT AND AIR PASSAGES—TRACHEOTOMY—LARYNGOTOMY.

We propose this morning, gentlemen, to call your attention to some of the diseases, accidents, and operations about the throat. The first of these of which we will speak is, *wounds* about the throat. When we take into account the number and the magnitude of the vessels about this region, and especially when we consider the nerves so important in respiration, that are situated here, we can readily understand, that a wound in the throat may be of very serious importance. A wound of the carotid artery may lead to instant death; a wound of the jugular vein, may give rise to such a venous hemorrhage as shall prove fatal. And with regard to this wound of the vein, I would beg leave to remark, that owing to the action of the chest, such an injury is apt to be followed by an ingress of air into the circulation and heart, giving rise to such serious consequences, that life shall be placed in jeopardy, or even destroyed instantly. Again: we have here the great *pneumogastric nerve*, which sends its branches to control the act of respiration. Should this be wounded, paralysis of the respiratory organs would follow, and death be the inevitable consequence. In the upper portion of the neck, we have also the thyroid gland, composed of numerous vessels; and a wound of this may cause death by hemorrhage. Again: we have the *larynx* and the *trachea*; and a wound in either, though not fatal, is of serious inconvenience. Still more important is a wound penetrating through to the *œsophagus*. I need not remark that wounds of the throat may vary in kind. We may have them punctured, lacerated, or incised, with or without loss of substance.

I do not intend to go into a discussion of the treatment at any length. Where venous hemorrhage comes on, you must strive to arrest it by the usual methods. If the carotid artery is injured, and you are called in time, cut down to, and secure it; and as regards wounds of the nerves, we can do no more than treat them upon general principles.

The points to which I shall most particularly call your attention, are *wounds of the trachea* and the *larynx*, and those complicated with injury to the *œsophagus*.

I need scarce remark, that a great number of the wounds of the trachea and larynx are inflicted by the patient himself, acting under a desperate determination to take his own life. When you come to discover how large a number of these cases there are, you will be astonished to find how few succeed in their object. The reason of the frequent failures, is the want of anatomical knowledge, and ignorance of the fact that the larynx is in advance of the artery, which retreats somewhat behind its level. The lingual artery may, in such cases, be involved, and cause death by hemorrhage. But whether a wound of the larynx or trachea be through the whole, or a part of its extent, the general indications of treatment are the same. Having arrested the hemorrhage in the ordinary way, approximate the edges of the wound, and promote their union. Now, as regards the approximation, there are two leading indications to be attended to. The first refers to position. You will perceive, that by bringing the head forward, you will keep the edges together. It is important, therefore, to attend to the position of the neck. Having approximated the edges, you should pass a band around the head, and one around the thorax, and unite the two by a third passing between them in front. The second indication alludes to the keeping of the parts approximated, and is best carried out by the use of the interrupted suture. There is one point here, however, to which I must direct your attention. It is, that your sutures must pass through the *external soft parts alone*. This I wish you particularly to understand. Your sutures must not enter the structure of the larynx, for they may give rise to such irritation as may cause death. With these precautions, you may bring the edges together, and apply, if you choose, some straps for additional security. The patient must not speak during the treatment, and he must be fed on liquids. Should deglutition be interfered with, the tube of the stomach pump must be passed in, and food must be injected through it. This treatment must be especially adopted, in wounds severing the entire larynx or trachea.

We sometimes have a fistulous opening following one of these wounds; and it is important to understand that this may be cured by an autoplastic operation. Paring off the edges of the fistulous opening, dissect up a flap from the lateral portion of the neck, apply it over the opening, and secure it there by sutures.

I have stated, that besides the larynx and trachea, the *œsophagus* may be involved. It may be cut partly, or entirely through, the larynx and trachea being also implicated. Here the treatment is the same as that already indicated. Stop the hemorrhage, and bring the edges together by interrupted sutures. If the wound be too narrow, dilate the external opening; and if it be difficult to find the wound in the tube, I would suggest to you to pass a gum-elastic tube into the œsophagus, by which means you will perceive the orifice at once. Here, as before, having dressed the wound, you should attend to the position of the part. We have here, however, another difficulty. The œsophagus being the tube through which nutriment passes into the stomach, every act of deglutition causes a stress upon the sutures, and in swallowing fluids, the only nourishment admissible here, they will pass out of the wound. It is well, therefore, in these cases, to pass food through the stomach pump. The records of science furnish some curious cases of this kind; one, in particular, in which the patient was sustained for some time by means of enemata, aided, it is true by milk baths. A very small amount of nourishment, I presume, was obtained from the milk; and the case serves to establish the fact, that life may be sustained by absorption from the rectum and colon. You may therefore resort to enemata when the stomach pump is inadmissible.

It sometimes happens, that in the performance of our duty as surgeons, we have to open into the very tubes of which we are speaking. In many cases of membranous croup, we open the larynx sufficiently to admit a free ingress and egress of air; and thus we may sometimes prolong or save life. Croup, therefore, is one of the diseases requiring those openings of the air passages known as *laryngotomy, tracheotomy,* and sometimes, though improperly, ***bronchotomy***. Again: in *œdema* of the glottis, where that opening is closed, and where the disease has extended so far, that life may be destroyed in a moment, we have another case in which the performance of tracheotomy is called for; and there are various other pathological conditions which call for this operation; as tumors internal or external, which press on the larynx so as to close it; deep-seated abscesses, which are so situated that you cannot reach to open them, and which press on the larynx so as to close it. When we consider these operations, we find that success varies with the diversity of the conditions demanding them.

In speaking of laryngotomy as a remedy in croup, I am bound to confess, that I have never succeeded with it; though if the records of science can be relied on, there have been cases of success. I am sorry to confess that there have been many failures. Where, however, the glottis is completely closed, and the patient is under such circumstances that he must die if not relieved, laryngotomy may be used as the last resource, and I apprehend you may resort to it with some little hope of success. But here there is one point to which I must call your attention. I refer to those cases of croup in which a membrane is formed. If this membrane exist only above and within the glottis, and closes it, you may then resort to an operation below, with some hope of success; but where the membrane extends below the glottis, far into the bronchial tubes, it would be worse than useless to operate, as it would only tend to exhaust the already flickering flame of life. To determine the extent of the membrane, you must resort to auscultation; and where you find the respiratory murmur clear and distinct, and have evidence of the proper state of the tube below the glottis, you may resort to the operation with some hope of success; which, however, will much more frequently attend it, when practiced on the other cases, of which I have spoken, viz: œdema-glotidis, deep seated abscesses, &c. Tracheotomy has here been resorted to, even under the most unfavorable circumstances, and been followed by perfect success. I say, then, in these cases, even though life appears extinct, though the pulse at the wrist is gone, and the face is livid, do not hesitate to open the larynx, and inflate the lungs, if necessary.

There is also ***another*** point here, to which I will call your attention. It is, that tracheotomy has been recommended in ***epilepsy***. In mentioning this circumstance, however, I wish to do so in a very guarded manner. I wish you to understand that the remedy has not been recommended in ***every*** case of epilepsy, but only in such cases as do not depend on any organic disease of the brain, or any mechanical irritation, for, under these circumstances, I apprehend that this operation could be of no avail. It is an operation, moreover, on which you can never positively rely; and I even doubt very much, if in any case, you can consider it a reliable means of cure.

When you perform the operation of laryngotomy, the point to be selected, is the space between the thyroid and cricoid cartilage, which is closed by the crico-thyroid membrane; though here you must expect to meet the crico-thyroid artery. When the object is to remove a foreign body from the larynx, it may only be necessary in some cases, to make a simple puncture, the sudden ingress of air being sufficient to remove it; and if this is not sufficient, then the body may be pushed up, by inserting a bougie. Where the body is too large, or some other circumstance renders a more extensive incision necessary, we can easily enlarge the cut, by carrying it through one or more of the rings of the trachea. In dividing these rings, there will be found a great difference between the adult and the child. In very young subjects, if you keep exactly in the median line, there will be no hemorrhage; but in the adult, though there may *sometimes* be very little, yet *generally* there is a considerable escape of blood.

There are various methods of performing the operation. Some divide the integuments until they come down to the larynx; then puncture it, and open with a bistoury on a director. Some perform it with a bistoury alone, making a perpendicular incision down to the crico-thyroid membrane, keeping strictly in the median line, and taking care to avoid, if possible, the crico-thyroid artery; then drawing aside the lips of the wound and waiting for all oozing to cease; then plunging a bistoury through the membrane; and opening it to a sufficient extent. This latter operation, I apprehend, is the best. Having opened the larynx, if it is desirable to keep it so for any length of time, you should insert a silver tube, and secure it in its position by a tape around the neck.

In the same manner *tracheotomy* is to be performed, making the incision at a point lower down, so as to divide one or more rings of the trachea.

LECTURE LIX.

EXTRACTION OF FOREIGN SUBSTANCES FROM THE AIR PASSAGES—ŒDEMA GLOTTIDIS—ABSCESSES ABOUT THESE PARTS—SEROUS TUMORS—GOITRE.

In our remarks of yesterday on the subject of laryngotomy, our limits did not admit of our going into extensive details. I pointed out, however, several circumstances, that might demand the performance of this operation, and remarked that it was often resorted to in membranous croup, and that, though sometimes it succeeded in these cases, it very generally failed. Now, I would remark, that where laryngotomy is performed for the extraction of a foreign body, a little additional care may be necessary for its withdrawal. Where the body lies in the chink of the glottis, there is seldom any difficulty in removing it; and if there is, by using a blunt instrument, it may be easily pushed up into the buccal cavity. But sometimes it is widely different. By inhalation, or some other cause, the body may be carried into the trachea, or even thence into one of the primary bronchi. The ease of extraction will depend on the body's weight, form, and other physical properties. Where it is smooth and light, after the opening is made, coughing will throw it out at once; but where it is heavy, and difficult to move, it is important to remember, that, by a change of position we can be aided very much in the removal of the body. A case is mentioned in which it was first suggested by Sir Benjamin Brodie, that the influence of gravity should be made available. The patient being placed upon an inclined plane, the object may be brought in reach, and, acted upon by gravity, be more easily removed. I mention this as of great importance. Bear in mind then, that when the body is of a nature to be affected by gravity, if other methods fail, you can, as it were, suspend the patient by his heels.

I need scarcely remark, that where the operation is performed for other purposes, it will be necessary to keep the aperture open, until the cause for the operation is removed. Thus, when it is resorted to for a tumor, which cannot at once be removed, it is necessary to keep the orifice open until the tumor is extirpated or otherwise removed. But where the operation is performed for œdema glottidis, for abscess, or any such cause, it is best, as soon as the cause is removed, to close the opening at once.

It is not my purpose to speak at length of *œdema glottidis*. It is an exceedingly fatal disease, and, to one unaccustomed to seeing it, it is hard to be recognized. But when you have seen several cases, you can never mistake it. There will be a prominence on each side, at the back of the fauces; and when felt with the finger, this tumor will be found soft and rounded. I have seen cases, in which, in addition to the other inconveniences, the tongue was thrust forward, and projected between the teeth.

Now, where you find this disease existing, I would recommend, that, in addition to the general treatment, you carry a proper instrument back over the tongue, and scarify the tumors freely, so as to allow the fluid to escape; and to continue the scarifying to the mucous membrane, and the sub-mucous cellular tissue, that the fluid may escape from them. After a few days, you will find the patient perfectly relieved of every dangerous symptom. You are not, however, to desist from your treatment. Should the symptoms continue, with cough, harsh breathing, &c., carry back, from time to time, an ordinary probang, wet with a solution of the nitrate of silver, and bring it to bear upon the part affected.

With regard to *abscesses*, I need only say, that they should be opened according to the ordinary rules of our science. I would remark, however, that owing to the neighborhood of the glottis, the pus—on the abscess being opened—acted upon by the inspiratory effort, is apt to be drawn into the larynx, and may produce suffocation. I would therefore recommend, that you make the puncture during the first stages of expiration.

Before I leave this subject, there is one affection, not generally met with in the books, to which I deem it expedient to call your attention. If you will examine the throat, you will find, near the os hyoides, and connected with it, a closed sac, or bursa, lined by a serous membrane, and secreting a fluid like that secreted by the membranes which protect the heads of the bones in the articulations. Now, where this sac becomes inflamed to a certain degree, it becomes distended, and projects, sometimes laterally, and sometimes on the median line, almost as low as the two lobes of the thyroid gland. It is a soft fluctuating tumor, and is sometimes mistaken for goitre. When very large, this tumor interferes with deglutition and respiration, and may produce a cough. What are the methods of relief in such cases?

I apprehend that the most expedient and the best is, to seize the tumor; extend the sac; plunge in a small trocar; draw off the fluid; inject a solution of iodine, and leave this there, precisely as in the radical cure of hydrocele. You will generally find the sac, a few days afterwards, distended and painful; but soon absorption will go on; the fluid will be all taken up; and the sac will be closed by granulation and adhesion. Where the operation fails, it may be repeated again and again. Another method of bringing about the same result is by seton; and, when both of these fail, we are obliged, as a last resort, to excise the whole sac. We lay the tumor bare down to the sac, taking care not to injure any important structure; and then we seize the sac in a vulsellum, and remove it. Should the whole not be removed, the remainder must be cauterized, and the wound be treated upon general principles.

Another disease, frequently occurring here, is an affection of the thyroid gland, known as *goitre.* Now, this gland is very vascular, being made up of a number of blood-vessels, the meshes of which are filled up with glandular matter. It is remarkably inclined to undergo changes; particularly by an enlargement of its vessels, and sometimes by a change in the internal substance. From whatever cause it may result, we have, at any rate, a gradually enlarging tumor, known variously as goitre, bronchocele, &c. I should remark, that so far as the internal arrangement of the tumor is concerned, it is infinitely varied. Sometimes it is made up of numerous small cysts, containing a straw-colored liquid; and at others it is composed of a continued chain of small cells. As to its consequences, you will perceive, that, being situated beneath a layer of the cervical fuscia, and being bound down by it, it must act mechanically upon the trachea, and may cause death by suffocation. Again; owing to its proximity to the gullet, it may obstruct it, and prevent the ingress of food; and from its relations with the great vessels of the neck, and particularly the vein, it may prevent the return of blood, cause serious derangement of the brain, and eventually produce very serious consequences.

Now, considering all these circumstances, and even disregarding the deformity, it becomes exceedingly important that our art should afford some means of relief. Various expedients have been recommended. The first which I shall allude to is, to secure the gradual wasting away of the tumor, by a ligature of the thyroid arteries, by successive operations. When the patient can stand this, I have no doubt that you will succeed in the cure. But it is an exceedingly hazardous procedure; and I must confess it is one from which I would myself recoil.

Another means is, to extirpate the gland. But from its intimate relations with numerous important vessels, and other structures, I am free to confess, that I should scarcely feel sufficient confidence, either in my heart, or my hand, to resort to such a plan. I have some little experience in surgical operations: there are few even of the most important, which I have not repeatedly performed. But of all of them, this, in which I once assisted, was the most appalling, tedious, difficult, and disagreeable. At every inspiration, the patient appeared to be on the point of suffocation; and notwithstanding every effort, air entered a divided vein, and the patient laid apparently dead for several moments, but rallied, and seemed to be doing well for some time, when she died from fever. Now, although the operation apparently succeeded in this case, it was so appalling, that though not very timid, I shall never again attempt to remove an enlarged thyroid gland. You may do so if you will.

Fortunately, there are other plans of treatment; and the best of these, I think, is, when the tumor is encysted, to open it with a trocar, and inject it with iodine. Where this fails, and there are no vessels preventing, you may incise the cysts, and heal the wound by granulation. Unfortunately, however, it sometimes happens, that an individual suffers from goitre, and there are no cysts; but the gland gradually expands; and the disease, if not relieved, may cause vesicular emphysema of the lungs. Should the case be urgent, there are two expedients to be resorted to. One is the gradual removal, from time to time, of different portions of the tumor, by strangulation with a ligature, which is made to pass through it by means of a needle, in different directions and as profoundly as may be safe. You may use a metallic, or a silk ligature. When you use the metallic—which is the best—you must continue to tighten it, from day to day, until the vessels of the part are destroyed, and it sloughs off; and you should then heal up the wound. From the nature of the gland, you will find it very apt to become atrophied when a part is thus destroyed; but where no disposition to this atrophy appears, you may repeat the operation. The chief difficulty is that arising from the neighborhood of the structures of the trachea. Inflammation may extend to these structures, and destroy the patient. Still I would resort to it, and if the glottis became closed, would avail myself of the benefit of tracheotomy, until the inflammation has subsided.

The other expedient is, to remove successive portions of the tumor by the knife, and at different times, taking care to save the skin. You may deem it exceedingly hazardous to cut into a substance so vascular; but what capital operation is not hazardous? Bear in mind, then, that all these operations are dangerous: and I cannot leave the subject without remarking, that in practice, you will frequently meet with these cases. But do not think from aught I have said, or from a love of operating, that you should operate upon them all. The lesson that I wish to impress upon you is simply this, that in *extreme cases*, rather than let your patient die from suffocation, you had better operate. With regard to the local treatment, I have very little to say. Iodine and burnt sponge, have been recommended; but I must confess, that I think they do no good. Indeed, I am free to acknowledge, that, in vascular goitre especially, where I have seen these iodine preparations used, the tumor has gradually increased; and there is reason to affirm, that throughout the economy, wherever stimulants are applied, the flow of blood is increased. For these reasons, then, I seldom resort to any of those applications; but on the contrary, when the tumor is vascular, I direct the patient to apply, from time to time, a relay of leeches, and in the intervals, to use mild emollient applications. More relief is thus obtained than I ever found from iodine, burnt sponge, &c. Do not misunderstand me, however. There are cases in which, from the indolent nature of the tumor, these preparations may do good: but, as a general rule, you will find the other course preferable.

LECTURE LX.

DISEASES AND ACCIDENTS ABOUT THE THORAX—WOUNDS, AND THEIR COMPLICATIONS—HEMORRHAGE—COLLAPSE OF THE LUNG—WOUNDS OF THE LUNG—EMPHYSEMA—PLEURITIS—EMPYEMA—HERNIA PULMONALIS—EXTRAVASATION OF BLOOD INTO THE CAVITY OF THE PLEURA—TREATMENT OF THESE ACCIDENTS—WOUNDS OF THE HEART.

We have certain diseases and accidents occurring about the *thorax*, to which it is necessary for me to call your attention.

So far as *wounds* in the regular contour of the thorax are concerned, there are some complications which it is very important that you should understand. You may meet with simple wounds of the parietes. These may, or may not, be serious. They are often serious from hemorrhage, which must proceed from the *internal mammary*, or some of the *intercostal* arteries. Where it proceeds from the *internal mammary*, all that you will have to do is to ligate the artery, in the manner illustrated some time ago; that is, by cutting down upon the intercostal space, and seeking the artery as it passes downwards nearly parallel with the sternum. Where the hemorrhage proceeds from the *intercostal* artery, in consequence of its passing in a groove, and being tied down by the intercostal fascia, you may find it difficult to draw out the end of the vessel. Sometimes when the external wound is small, the *outward* hemorrhage may be slight, and you may be disposed to think it of little consequence. But the hemorrhage may go on *internally*, and the danger may not be discovered until too late. When the external wound is small, and the vessel is bleeding internally, it is your duty, to dilate the wound, to seek the vessel with a pair of Physic's forceps, to pass a needle with a ligature, and to tie up the artery. Where you fail in doing this, and time presses, insert the finger, and compress the artery. It may be necessary to keep up this pressure for some time; and a case may even occur, in which you may find it necessary to have a relay of assistants for this purpose.

As regards other external complications, I deem it unnecessary to refer to them; for, with the exception of those cases already spoken of, wounds of the parietes of the thorax are treated as wounds elsewhere.

An instrument may penetrate into the cavity, without wounding any of the organs; yet the result will be a complete *collapse* of the lung on that side, from air rushing in, and forcing the organ up to the superior and hinder portion of the side to which it belongs. All that is to be done here is, to stop any hemorrhage, in the manner already described, to remove foreign bodies, if there are any, and if there is neither hemorrhage nor foreign material, to close the wound at once, by adhesive strips or suture, and heal it as soon as possible, thus excluding the atmosphere. As soon as the air which has entered the cavity is absorbed, the lung will resume its natural position; and if there is no other complication, the patient will recover and suffer no subsequent inconvenience.

Wounds of the thorax, however, are not always thus got rid of. They may involve some important organ, or some blood-vessel, as there is no organ in the cavity, which may not be implicated in the wound. There is, therefore, a great difference in the prognosis. There are some injuries, as wounds of the heart and great vessels, or of the thoracic duct, which must, necessarily, prove fatal. It is through this duct that all nutrition takes place; and it is necessary, therefore, that we enter into some detail in regard to these accidents.

In the first place, then, we will consider *wounds of the lung*. When you remember the extreme vascularity of this organ, and that it is composed of minute ramifications of the air tubes and blood-vessels, you will at once perceive that even slight wounds, penetrating either lung, must involve some of these vessels and tubes. This will at once enable us to understand some of the attending circumstances of such wounds; for, as in the instance just spoken of, there will be collapse of the lung, hemorrhage from the mouth, &c. This hemorrhage is sometimes slight, and sometimes very profuse, and always accompanied with more or less difficulty of respiration, and cough. As I have stated, it is sometimes slight. In other cases, the bleeding is so profuse, that if it is not quickly arrested, the result is promptly fatal. Another circumstance, frequently attending wounds of the lung, sometimes following promptly, and sometimes after the lapse of some hours, is an infiltration of air into the cellular tissue, drawn, partly from the external wound, and partly from the wound in the bronchial tubes. It may take place into the cellular tissue of the lungs, or into the tissues between the pleura and the ribs; and, as this cellular tissue is in continuity throughout the system, the whole body may become puffed, as though a bellows had been inserted, and the body blown up. Here there is no pitting as in a collection of fluid. In consequence of this infiltration of air about the neck and body, and especially about the glottis, this *emphysema* may quickly destroy the patient.

Again: taking place sooner or later, we may have *pleuritis,* or inflammation of the pleura, as a consequence of a wound of the thorax. This is a dangerous complication; and, unless promptly subdued, it will soon prove fatal to the patient.

Again: it sometimes happens, in consequence of a wound of the lung, that a difficulty takes place of a different nature, and appearing at a time more remote. The external wound heals, but a *pseudo membrane* is thrown out from the pleura, and a serous or purulent fluid fills up the cavity. The ribs bulge; the diaphragm is pressed down; and respiration is carried on almost entirely by the lung of the opposite side. This condition may continue for some time; but ultimately the patient becomes the subject of irritative fever; and, unless relieved of this, he dies. This purulent collection in the thorax is called *empyema;* and it is not unfrequently the result of wounds in this region.

In wounds penetrating the thorax, we sometimes, though rarely, have a protrusion of a portion of the lung, or a case of *hernia pulmonalis;* and this may occur, whether the lung be implicated or not, especially when the external wound is large. The reason that this is not apt to occur is, the liability of the lung to collapse, on account of the rushing in of the air. It occasionally takes place, however, from the wound happening at the moment of a strong inspiration.

There is another consequence of these wounds, and one of great importance, being a necessary result whenever any vessel of the lung is wounded. I mean *an extravasation of blood into the cavity of the pleura.* Blood is thrown out from the wounded vessel or vessels; and, unable to flow outwardly, it by degrees compresses the lung, and fills the whole cavity; thus considerably embarrassing the respiration. When it reaches this extent, it is important that a sufficient amount of air should enter the lung to support life, or the patient will die of asphyxia.

Such being the principal consequences of a wound in the thorax, we shall now proceed to *the treatment* of these accidents. When we inquire what are the duties of the surgeon in these cases, we find that there is a wide difference of opinion. In general terms, I have remarked, that the first duty is, immediately to close the external wound; and it is in reference to this very point, that a difference of opinion exists. Some contend for a course exactly the reverse, advising that the wound be left open and dependent, so as to allow any blood that may collect to flow out. This is a practice very highly recommended, and I confess, that there are circumstances under which it may be adopted; but, when you consider those steps by which nature, when unaided, stops hemorrhage, you must admit, that by this course, you place the patient in that very position in which nature is deprived of all the collateral aid, by which she is enabled to form a clot in the vessels. Such, I say, would be the result of placing the wound in a dependent position, and allowing the blood to flow away. Let us next see, what would be the result of closing the wound. Blood would gradually fill the pleural cavity and the wound in the lung, and the coagulum which forms, not being able to escape, extends up to the wounded vessels, thus affording a temporary check to the flow, and rendering all safe, until plasma can be thrown out. I say, then, that *all wounds implicating the thorax should be closed as soon as possible.* But you may reply, that thus we cause an accumulation in the pleura, to such an extent, perhaps, as shall encroach upon the mediastinum. This is true; but, generally, we have only to leave the accumulation alone, and it is gradually absorbed. Should it, however, be necessary to interfere, then, after the external wound has healed, all we have to do is, to seek the most dependent point, and, by performing the operation of paracentesis, to draw off the fluid. This, I apprehend, is the best method of treating these wounds.

Having closed the wound, and attended to the other circumstances of which I have already spoken, are we calmly to stand by and do nothing more to aid our patient? Certainly not. Where the hemorrhage is profuse—if you find blood flowing freely from the wound, and also voided by expectoration—I say, that under these circumstances, if the patient is young and strong, you should not hesitate a moment; but place him in the erect posture; tie up the arm; and bleed him *ad deliquium.* At first it may appear that this procedure is absurd, as there is too great a loss of blood already going on, to admit of a further loss. But this objection is more *apparent* than real; for a certain flow must take place, before the hemorrhage at the wound can cease; and it is far better that the blood should come from the arm, than from the wound, where it may do so much harm by extravasation. I say, then, when you are called soon, and the patient is not too much reduced, you should bleed, *in the erect posture*, and *ad deliquium;* and then you should place him in a horizontal position, his head being slightly elevated, and carefully inspect and dress the wound. Repeat the bleeding as often as may be necessary; place the patient under the influence of tartar emetic; and give opium freely, to prevent cough.

Having stopped the hemorrhage, there are other circumstances to be looked after. We have seen that sooner or later *pleuritis* or *peripneumonia* may be developed. Now, as soon as either of these appear, or any of their symptoms, you should bear in mind, that they may follow traumatic inflammation, and that this may be quickly fatal; so that all that can be done, must be done promptly. Combat the inflammation at once, by leeches, general blood-letting, and all those methods that are used in combatting pleuritis or pneumonia under other circumstances. Where the constitution is good, and the disease has been allowed to go on from day to day without being checked, I would advise you to resort to the preparations of mercury, aided by squills, digitalis, &c., also using revulsives to the chest. But where the patient is already exhausted by hectic, and there is no time to be lost, the operation of *paracentesis* must at once be resorted to. If the wound is on the right side, seek for the intercostal space above the sixth rib; with a scalpel divide the integuments parallel to the upper border of the lower rib; expose the intercostal muscle; insert a grooved director, and cut upon it, first in one direction, and then in the other; divide the aponeurosis; expose the pleura; and then draw off the liquid. Some have recommended to keep open the external wound. I, however, object to this; and in order to close it at once, I would advise you to draw up the integuments before making the external incision, so that they may form a kind of valve; and if the fluid collects again, repeat the operation, rather than keep open the wound. When the operation is to be performed on the left side, it is necessary, from the position of the heart, to vary the spot for the opening, and to operate very far back, on the border of the longissimus dorsi.

As regards other wounds of the thorax, those involving the heart, great vessels, thoracic duct, &c., it is unnecessary to say much. Those of the heart, though generally fatal, are not always so, even where the left ventricle is wounded. There are instances, where the wound has been so narrow, that the clot has closed it before the blood could flow out into the thorax; and the patient has recovered. But where the wound is large, though sometimes there appears to be a recovery for a short time, a sudden flow of blood will cause death. So also with wounds of the large vessels; for the most part, they are necessarily fatal. Hence I need not say much of them here. The annals of science show some curious examples of wounds in the heart, followed by recovery, especially among the lower animals. So, also, are there some curious examples among human subjects. One case I remember, where a plug was driven into the heart, and, notwithstanding this, the lad lived five months. The case is given upon good authority; but I mention it, not to encourage you with hope in the treatment of such wounds, but merely as a curious example.

LECTURE LXI.

WOUNDS ABOUT THE ABDOMEN—WOUNDS, SIMPLE AND COMPLICATED—PROTRUSION OF ORGANS—WOUNDS OF ORGANS AND THEIR TREATMENT.

We design this morning, gentlemen, to make a few observations on *wounds about the abdomen*. In our last, we had occasion to remark, that on account of the importance of the organs in the thoracic cavity, a wound about that neighborhood was of a serious, and often fatal character. We may apply the same remark to wounds about the abdominal cavity. In this cavity we have organs of the utmost importance—the kidney, the bladder, the stomach, liver, intestines; in the female, the uterus and its appendages, &c., besides vessels of great size, and most of them of great importance.

In our remarks concerning these wounds, we find it convenient to pursue the same course as in speaking of wounds of the thoracic region. First, we have those wounds which, while they penetrate the cavity, injure none of the important organs of which I have spoken. These wounds will differ in importance, according to their extent. A wound may, for example, only penetrate the cavity, and be of so little extent that no organ will protrude, and there will merely be a solution of continuity of the abdominal walls.

The ultimate consequences of these wounds are very uncertain. They may heal without any difficulty; or they may result fatally, from being complicated with a wound in some large vessel, causing a great flow of blood into the cavity; which condition the surgeon may not detect, until the patient is about to expire. They may also become serious from the supervention of inflammation of the peritoneum. This membrane is exceedingly prone to inflame; and, when once inflammation is established here, it extends rapidly. Hence, after the lapse of a short time, a simple penetrating wound, apparently trifling, may expose the patient to the risk of his life. A wound of any considerable extent is apt to be attended with a protrusion of one or more of the organs contained in the cavity. The character of the organ protruded, and the extent of its protrusion, depend on the position and extent of the wound. The very circumstances attending the reception of the injury, often expose the patient to accidents of various kinds. The protruded organ, for example, is exposed to the atmosphere, and when the patient falls to the ground, it may become covered with dirt, pebbles, &c., which often become the cause of very serious results. As you may well suppose, the ultimate consequences of those wounds accompanied by protrusion are more apt to be of a fatal tendency than if they were not thus complicated. Especially are such wounds liable to be followed by violent peritoneal inflammation, extending to those organs most connected with the point of injury. We should, therefore, be very cautious and guarded, and not treat lightly the first symptoms of peritoneal inflammation.

Let us then see what are the duties of the surgeon in wounds of the abdomen, putting out of the question those complicated with injury to some of the organs. First, he must stop the hemorrhage; and then he must carefully approximate the edges of the wound.

The means of accomplishing this latter indication, are various. In the first place, you should avail yourself of *position*. Fix the patient on his back, with his head and shoulders elevated, and with the thighs slightly flexed on the pelvis. Such a position will relax the abdominal muscles, thus preventing the pressure which they would otherwise exert, and which might cause a protrusion of the organs, as well as a gaping of the wound. Your second means of approximation will consist in the application of interrupted or quilled sutures. In most cases, these will be sufficient, with the aid of adhesive plaster, and the application of compresses and a roller, or a bandage carried round the abdomen, and so arranged as to press on the point of injury.

These are all the general rules of treatment in such simple cases. In all cases where union by the first intention may be hoped for, pursue the same course, as by so doing you can lose nothing.

Where you have, associated with the wound, a protrusion of some organ, your duty is a far more serious one. Here, after stopping the hemorrhage, you should cleanse the protruded organ with tepid water, or with milk and water, and, having placed your patient in such a position as to relax the abdominal muscles, by cautious and gentle means, return the organ into the cavity, and then close the wound as in the previous case.

But your duty does not stop here. You must carefully watch over the case; not with regard to the wounded part alone, but in fear of violent inflammation coming on. Any sign of this will call for prompt and free blood-letting; for leeches on the painful parts; and for the evacuation of the bowels. Besides all this, you should place the patient on large doses of calomel and tartarized antimony; you should use fomentations to the abdomen; and *more than all*, you should give *large doses of opium*—I say, *large doses of opium;* for, however useful this agent may be, in all the phlegmasiæ, yet there is no form of inflammation in which it is so useful as in *acute peritonitis*, and especially in *traumatic peritonitis*. Should it be necessary, you must repeat the blood-letting from time to time; but as the vital energies grow weak, your reliance must chiefly be placed on calomel, tartar emetic and opium. You should push the use of the latter to the fullest extent, without producing the unpleasant effects upon the brain, which sometimes supervene. When the vital forces are impaired, you must substitute leeches for venesection; and it may sometimes also be necessary to control irritation, by the use of blisters and other counter-irritants.

These are the means which you are to adopt; and allow me to say, that provided you do not delay too long, or do not resort to them with a timid hand, you will often have the satisfaction of seeing that success crowns your efforts.

With regard to the use of opium it might be interesting to inquire, how any agent, partly stimulating in its effects, could be useful here. I should suppose that, by its sedative operation, it lessens the flow of blood to the part. This, however is not all, for opium greatly modifies the action of the capillary vessels, which are very numerous here; and there is also another important reason to be considered in reference to its use in cases of acute peritonitis. While the intestines are in their natural position, there is a kind of perpetual motion in these parts, stimulated into action as they are, by food, drink, &c. But as perfect rest is highly important in the treatment of any inflammation, it is a matter of the utmost consequence that the bowels should be kept as still as possible in the treatment of violent peritonitis, and it therefore becomes necessary, if I may so say, to stop the organ. But be this reasoning satisfactory or not, *experience* upholds us in continuing this method of treatment.

Let us next go on to speak of those injuries which are complicated with wounds of some of the abdominal organs. These injuries differ as to the different organs, nay, even as to the different parts of the same organ.

The alimentary canal is a hollow organ, destined to contain articles for nourishment, and also to receive the products of the secretory action of various organs; so that a wound entering the canal, will be followed by a flow of these, its contents, into the peritoneal cavity. As the peritoneal membrane is exceedingly delicate, these bodies cannot fail to excite violent inflammatory action, running on, unless it can be arrested, to the speedy death of the patient. But this is not all; for suppose the *liver* be implicated in the injury. This is an extremely vascular organ; and a wound in any part of it must open such vessels, as shall cause hemorrhage to an alarming, or even fatal extent. Unfortunately, too, this hemorrhage is concealed, and consequently is only known to exist by its effects. We have also, traversing the liver, numerous excretory tubes, or ducts. A number of these ducts must also be wounded; and thus the bile, a very irritating matter, flows into the peritoneal cavity, and cannot fail to cause violent, and often fatal inflammation. It will be even worse, if the wound penetrates into the excretory duct of the gall bladder, or into the gall bladder itself. So serious are these wounds into the duct, or the bladder, that they may be pronounced, at once, as fatal, not from any immediate consequence, but from the violent peritonitis, to which they give rise. Again: when a wound penetrates the spleen, from the vascular nature of this organ, it is apt to end suddenly in fatal hemorrhage, or to result in a similar manner as those spoken of above. So, also, when wounds penetrate into the bladder, kidney or ureter;

such wounds are almost necessarily fatal; as the urine is of so acrid a nature, that it will speedily cause the death of any part with which it may come in contact.

As regards wounds of the ovaries and uterus, in the female, the first thing to be remedied is hemorrhage; and the next to be guarded against, is *metritis* or *ovaritis*, either alone, or combined with peritonitis. With regard to wounds of any of the large vessels, I need say nothing in addition to what was said yesterday on injuries of the thoracic vessels. They are generally fatal before their precise nature is discovered. Such are the *general indications* to be fulfilled, in the treatment of wounds of the abdomen. But this is a subject of so much importance, that I must consider it under several different heads.

Suppose, first, a wound in the *stomach*. It will be your duty, after having cleansed the wound, and removed all foreign bodies, to bring the surface of the wound in the stomach together by means of animal sutures; and then to close the external wound. The external wound may not be of sufficient extent to expose the wound in the stomach; and yet you may be sure that it has been punctured. Now, when you *have not strong reason* to suppose that such is the case, I apprehend that *nothing will justify your extending the wound to examine the stomach*. Your chief reliance must be placed upon keeping the patient quiet; combatting the first appearance of inflammation; and allowing nothing whatever to enter into the stomach. The patient meanwhile is to be supported by *enemata*.

So, also, when the *intestine* is punctured; if the external wound, does not expose the internal, you must, as in the preceding case, rely on the same treatment; and *nothing will justify your opening the abdomen* to seek the wound. Where, however, the intestine has protruded, and you find a wound in this protruded portion, a different procedure is necessary; or, where you discover no wound in the protruded part, but are sure from the escape of fæces or other indications, that there is one higher up, then it may be expedient to draw out the adjacent convolutions of intestine, and examine them most carefully, passing them through the hand until you find the point or points, (for there are sometimes more than one,) which have been injured. When you find these wounds, your duty is, to close them as soon as possible. Suppose the wound has entered, but not passed through the intestine. All that you will then have to do is to cleanse and empty the bowel, to close it by one, two, or more sutures, and cut these off close to the knot. The animal ligatures are the best in these cases. Having finished this dressing, and cleansed the parts thoroughly, the question arises, whether you should return the intestine into the cavity, or secure it by ligatures, to the external wound. Where the wound is *transverse* or *oblique*, and if it is of limited extent, I apprehend that there is no occasion to keep the injured intestine in contact with the external wound. Plasma is thrown out rapidly under such circumstances, and not only prevents extravasation, but even unites the intestine to the surfaces with which it is in contact. The ligature soon sloughs out, into the intestine, and gives no farther difficulty.

Suppose, however, that the intestine is cut *entirely through.* Here we cannot unite it sufficiently to prevent extravasation; and the best method is, to draw out the ends of the intestine at the external opening, and apply the suitable ligatures, keeping the intestine at the external wound; which wound should be kept open, until the fecal matter passes by the natural way. In this connection I would mention, that various methods, and modifications of this operation have been proposed from time to time. Few of them, however, will be found to succeed *on man.* The principal one of these, is that of Gobert; which chiefly consists in passing the upper end of the intestine into the lower, and retaining it there by sutures. To succeed in this plan, however, another modification is necessary. You are aware, that mucous surfaces will not adhere to serous ones. It becomes necessary, therefore, to turn the margin of the lower end in upon itself. Having done this, we bring the upper serous surface into the lower, and secure it in contact by points of suture, taking care not to close the external wound, until these parts are perfectly healed. Then it may be closed, and the ligatures will pass off as in other cases. This method will succeed very well *with the lower animals*, and *sometimes*, even with man; but I doubt if, on the whole, the method already spoken of will not be found the best. There are several other expedients, which I think it unnecessary to mention here. I will merely observe, in concluding, that, having attended to these preliminaries, we must expect inflammation, and that we must combat this by the most powerful antiphlogistic treatment. Blood-letting, general and local, should be practiced with a liberal hand, and repeated, if necessary, according to the urgency of the case; fomentations should be applied to the abdomen; and opium, to allay pain and quiet the peristaltic action of the intestine, will often render essential service. It is desirable that the contents of the bowels should be evacuated, but purgatives and enemata are of doubtful propriety. The latter, so generally recommended, even at the outset of the treatment, I have known to destroy life where the large intestine has been wounded, by the fluid of which they are composed, passing through the wound into the peritoneal cavity. When you have reason to suppose, however, that the wound is high up, injections should be used early, to empty the bowels. The patient should be confined, during the whole treatment, to small quantities of the mildest mucilaginous and farinaceous drinks. In some cases, by your skill and judgment, you may save life; but generally, such inflammatory action is set up, as shall inevitably result in death.

You must not, however, suppose that every wound which transfixes the abdomen and peritoneum, must also involve, of necessity, some of the contained organs. There are cases, in which gun shot have raked through this part, and swords transfixed it, without injuring, in the slightest degree, any of the organs within. You must, therefore, be guided by circumstances. *If blood passes by stool,* then the *intestine is wounded.* If there is *great collapse,* then *some vessel* is wounded. If *these symptoms are absent,* then the chief difficulty to be contended with will be the wound in the parietes.

ESSAY No. 7.

OPERATIONS ABOUT THE ABDOMINAL WALLS — PARACENTESIS ABDOMINIS—PUNCTURE OF THE URINARY BLADDER—OPENING SMALL INTESTINES—GASTROTOMY.

Among the enlargements and swellings for which surgical aid is desired, perhaps there is none more common than that caused by a collection of serum within the walls of the abdomen, either as one large cyst enclosed by the peritoneum, or as several cysts collected together within the peritoneal cavity. Ascites will frequently increase under the most skilful medical treatment, and the accumulation will go on to such an extent as to threaten immediate death by suffocation, if relief be not promptly afforded. Under these circumstances *paracentesis abdominis,* or tapping of the abdomen, becomes necessary.

There is great difference of opinion with regard to the curative tendency of this operation. Some surgeons believe that dropsy of the belly may be perfectly removed by this means alone; while others contend that it will always, sooner or later, be followed by death. I am inclined to believe that as a curative measure, paracentesis is quite valueless; as in every instance the water will reaccumulate, and the swelling, and consequent suffering, progress even more rapidly than before. Be this, however, as it may; there can be no doubt that tapping for ascites, causes an instantaneous relief from great suffering, and that this relief is of a day or two in duration: during which period, the patient is comfortable; and all the functions of nature are regularly carried on, thus affording to remedies a better opportunity of acting, and in some degree restoring the sufferer to strength. Indeed, so great is the relief afforded, that if the individual has ever been tapped before, it will be a difficult matter for his surgeon to resist his importunities; for tapped again he certainly will be. The operation is one of the easiest, quickest, and least painful in surgery, and is very seldom followed by any inconvenience.

In performing this operation, the French surgeons generally, recommend that the instrument be passed at some spot in the left flank; and when no particular reason exist for selecting otherwise, the puncture is made through the center of a line drawn from the anterior superior spinal process of the ilium on the left side. The English and American surgeons, on the other hand, prefer introducing the trocart through the linea alba, somewhere between one and three inches below the umbilicus. If operated upon in the first method, the patient may remain on his back; but if after the English fashion, he must be seated on a chair, or near the edge of his bed, and the body must be kept erect.

Several forms or modifications of the trocart have been from time to time recommended. Bell speaks highly of a small flat instrument, which is also lancet pointed; and this instrument, under various modifications, has been very generally adopted. I find, however, that an ordinary triangular pointed trocart of medium size answers the purpose as well as any other. When about to perform the operation, a-piece of strong homespun should be procured, of sufficient breadth to extend from the sternum above to the spine of the ilium below, and long enough to pass around the body. This should be split from either end to within about six inches of the center. The point of puncture having been selected, the bandage of homespun is passed around the body, its ends being crossed behind and held by assistants, and a hole having been cut through its center. This hole is so placed as, through it, to leave the point of puncture bare. The surgeon should then place himself in front of the patient, holding the trocart in such a manner, that the handle will press against the palm of his right hand, the thumb and index finger of which should pass along the trocart and press firmly upon it, so as to regulate the depth to which it is pushed. The assistants then drawing upon the ends of the bandage so as to make constant pressure upon the abdomen, the trocart is driven into the cavity by a sharp quick blow. The operation is performed in a second, and is almost painless. As soon as the instrument has penetrated the abdominal walls, the stylet should be withdrawn, the canula being firmly held in its position, by the first and middle fingers of the left hand. Whilst the water is being drawn off, the bandage must be kept constantly tight enough to keep up a firm pressure on the abdomen, otherwise a fainty feeling may overcome the patient. Should fainting actually occur, the flow of water must instantly be put a stop to, some gentle stimulant given, and the patient kept quiet until all unpleasant feelings have passed away when the drawing off of the liquid may be resumed. When this is necessary, it has been recommended by Fleury, to leave an elastic gum catheter in the opening after withdrawing the canula. This catheter should be introduced through the canula after the stylet has been drawn out; and as soon as this is done the canula itself is withdrawn, leaving the gum catheter in the wound; which may be worn for several hours without inconvenience, as it adapts itself to the position of parts, and the water flows constantly through it, the flow being easily checked or stopped, by pressing a cork into the orifice of the catheter, and resumed when the feelings of the patient will permit. When as much of the water as can be drawn off is removed, and the instrument is withdrawn, the bandage should be carefully and smoothly adjusted over the abdomen, the ends drawn moderately tight, and either tied behind, or drawn forward and pinned in front. The wound only requires simple water dressing, and will give no trouble. Should hemorrhage occur—which is very rare—the entire soft parts around the tumor may be caught up between the fingers, and firmly pressed, until the disposition to bleed has ceased. This operation is not generally resorted to, until great distention and consequent suffering renders it necessary. Bell, however, advises, and with apparent justice, that the liquid be drawn off early; and as no evil is apt to result from the operation, and much suffering is thereby saved the patient, it will perhaps be well to follow his advice, at least in such cases as are found to increase rapidly, as it appears generally admitted that the collection returns much sooner after the operation, if the previous effusion has been great, than when the accumulation was of small amount.

The *urinary bladder* sometimes becomes so much distended by its contents as to endanger life, by a rupture of that cyst, and the consequent discharge of urine into the abdominal cavity. This distention of the bladder may be the result of a paralysis of that organ, by the pressure of a tumor on the urethra or neck of the bladder, or any cause calculated to check the discharge of urine, without also checking its secretion. Under such circumstances, puncture of the bladder and the drawing off of the urine becomes necessary.

Two methods of performing this operation are now recognized among surgeons, puncture through the rectum, and puncture over the pubis.

Formerly it was also sometimes recommended to enter the bladder through the perineum, or to draw off the urine by forcing an instrument into the bladder through the urethra: these methods, however, are no longer recognized.

Of the two methods now adopted, puncture *over the pubis* appears to be most generally preferred. When about to enter the bladder from this point, the patient should lie on his back in the right side of his bed, and near its edge, with his head and shoulders slightly elevated, and his legs drawn up. The surgeon then, standing on the right side, should make the integuments terse above the pubis, by stretching them apart with the finger and thumb of his left hand, while he plunges the trocart at right angles to the axis of the body, into the bladder, through the linea alba, about an inch and a half above the pubis. The instrument used should be about four inches long, and of such a curvature as to represent the part of a circle, whose diameter is six inches. When used, the concavity of the trocart should look towards the pubis. The stylet should be immediately withdrawn, and the canula kept in its place by tapes attached thereto, and fixed to a bandage, previously passed around the body. After the bladder has been emptied, the canula should be closed by a piece of cork, and left in its position until the urine finds a vent again *per vias naturales.* While worn, the canula must be uncorked from hour to hour, and the urine be permitted to come away. After the seventh or eighth day all danger of infiltration of urine will have passed, as the course of the canula will then have become lined by an adventitious membrane isolating it completely.

Should puncture *by the rectum* be preferred, the patient must lie on his back with the legs drawn up, as though about to undergo the operation for stone. The left index finger, being then well oiled, is introduced into the rectum, and passed on until the tumor formed by the enlarged fundus of the bladder is plainly felt. A curved trocart, about four or five inches long, is then passed along the finger as a guide, the convexity of the instrument resting on the finger, and its piercer drawn just within the canula. The trocart is passed in, until it reaches the anterior wall of the bowel at the spot touched by the bladder, and the handle being then driven forward by a firm quick stroke, the point is bared and enters the bladder, followed by the canula. The instrument being kept in situ, the finger is withdrawn from the rectum; the piercer is then also removed, and the canula, held between the index and middle fingers of the left hand, is left in the bladder. As soon as the urine has all flowed away, the canula should be corked and left in its position, remaining in the bladder until the urine finds a vent through its natural passage again. As soon as this occurs it may be withdrawn, and the wound will soon heal. The most convenient method of retaining the canula in the bladder is to secure a bit of tape to it, and then passing one end in front and the other behind, attach them to a bandage passed around the body for that purpose. If this method does not succeed, a compress and bandage must be applied over the rectum. The canula being closed by a cork, the urine can be let off from time to time; but if this be objected to, the instrument may be left open and the urine permitted to drip constantly away. In the latter case the canula should communicate directly with some vessel.

After this operation, the greatest difficulty results from the removal of the bandages, &c., necessary on the patients going to stool. At this time the canula should be lifted up as much as possible, and pressed firmly against the upper wall of the rectum while the feces are passing.

The chief object to be kept in mind when reverting to these operations, is that we avoid wounding the peritoneum with the trocart. It will be remembered that this membrane being reflected over the base of the bladder, falls slightly in front and behind it, forming a hanging pouch between the bladder and pubis before, and between the rectum and bladder behind. Hence, when the fundus of the bladder is lifted by the filling and distention of that viscus by urine, the peritoneum is pushed up, in such a manner as to leave a large space, of both the anterior and posterior walls of the organ, uncovered by serous membrane. It is through this naked part of the walls of the bladder that the trocart is passed in each of these operations.

Some authors of high authority contend that these operations are never necessary, and maintain that forced catheterism is always preferable. Erichsen, after describing the operations, observes: "A far safer procedure than this, and one that is recommended by Sir B. Brodie, Mr. Liston, and most surgeons of authority in these matters, is forcible catheterism. As the retention is generally owing to an enlargement of the middle lobe of the prostrate, relief may be afforded by pushing the point of a silver catheter through this obstacle into the bladder. A false passage is thus formed, in which the instrument should be left for about forty-eight hours, when it will generally enter it with sufficient readiness on being introduced again."

On the contrary, many distinguished surgeons, among whom is Sir Astley Cooper, recommend puncture above the pubis, as a simple and efficacious remedy. Cooper prefers a straight trocart and canula, both of which should be rather short. These he introduced into the bladder just above the pubis, in a downward and forward direction, having first incised the integuments. The water having been drawn off, he recommends the substitution of a gum elastic tube for the silver one, as less apt to cause ulceration and more easy to the patient.

It sometimes happens that *scirrhus* attacks the large bowel, and its calibre becomes thus gradually lessened, until eventually it is quite closed. Under these circumstances, or where the contents of the bowels are retained from the closure of the rectum from other causes, it may become necessary to open the intestines through the abdominal walls, and so give exit to the feces. The bowel may be opened anywhere above the seat of obstruction, and having been thoroughly emptied of its contents, should be securely fastened to the external wound and caused, if possible, to adhere thereto. M. Sittre, the first surgeon who recommended this operation, advised that the opening be made in the left iliac region at the sigmoid flexure of the colon. Since that time the operation has been frequently performed on different parts of the body, and in the first case recorded, in which the operation was performed on an adult, the cœcum was opened from the right side. Surgeons have now generally settled upon two methods of operating in such cases; the method of Littre, and that of Calisens, as modified by Amussat.

According to the first method, or that of Littre, "the subject lying on his back, make in the left iliac region an incision, commencing on a level with the anterior superior spine of the ilium, and prolonged almost parallel to Poupart's ligament, to the extent of two or three inches. The integuments, muscles, and fascia transversalis, are successively divided with precaution; after which the peritoneum is opened and the sigmoid flexure sought. Sometimes it has happened, that immediately after the opening of the peritoneum, a portion of small intestine has protruded, and its dilatation, with its color, reddened by inflammation, cause doubt. You recognize the nature of the intestine by the absence of expansions and longitudinal bands, and by the resistance of the mesentery which comes from the right side, whilst the resistance of the iliac meso-colon is felt from the left. Moreover, the colon has a natural tendency to present itself at the opening. A loop of thread is passed into the meso-colon to fix the intestine to the wound, and the intestine is divided longitudinally. It is evacuated; and at the end of two or three days when the adherences have united the intestine to the peritoneum and external wound, the thread may be removed; but care must be taken lest the new anus contract too much."—(Malgaigne.)

The operation of Calysens, as modified by Amussat, is thus described by Erichsen. "A transverse incision is to be made two fingers breadth above, and parallel to the crista ilii of the left side, or rather in the middle of that space, which is bounded by the false ribs above and by the crista ilii below; the incision should commence at the external margin of the erector spinæ and extend outwards for about four inches. The spinous process of the lumbar vertebræ, the crista of the ilium, and the last false rib, are the principal guides. The superior margin of the crista ilii is, however, the safest of these, and the transverse incision may be said to correspond to the middle third of this part of the ilium. After having divided the skin, and all the more superficial tissues, the deep layers are next to be incised as they present themselves;

if necessary the external border of the quadratus lumborum may also be cut across. The dissection is then very carefully to be carried through the layers of cellular tissue, which lie immediately upon the intestine, and the colon sought for; this will, in general, readily present itself, and may at once be recognized by its color and distended appearance. The operation may then be completed by passing a tenaculum or needle armed with a strong waxed thread, into the most projecting part of the gut and by this means drawing it to the surface of the wound, in order to prevent its shrinking or sinking back when opened. It is now to be punctured with a large trocart or bistoury, and its contents having been evacuated, the sides of the opening in the intestine are to be fixed to those of the incision in the skin by four or five points of suture, so as to prevent the contents of the bowel being effused into the cellular tissue of the wound. It is of importance to draw the colon well forward before opening it, in order to prevent its contents from being effused into the loose cellular tissue, where they may set up considerable irritation and retard the union of the parts. If the patient is very fat, the operation will be much facilitated by dividing the deeper seated tissues in a crucial manner, so as to give the operator more space." I will only add, that what is regarded as the great advantage of this over the original method of Callisens, is, that the incision being made in a line parallel with the course of the larger nerves and vessels, they remain uninjured. The peritoneum, too, remains uninjured, and it is for this reason that the operation is so seldom followed by peritonitis. It has been observed, that even where death results, no symptoms of inflammation have occurred, the death having depended on some other cause. The exemption from peritonitis may, in a measure, however, result from position, as the patient lies on his back, and the wound being dependent, the contents of the bowels escape freely, without any cause to make them settle, or become effused in the surrounding tissues. This is the method of operating, which is preferred at the present day; and when resorted to, the patient, when being operated on, should lie on his belly, slightly turning on the right side, with the body raised by placing one or two pillows under the belly.

The bowels sometimes become obstructed by a foreign body retained in them, by strangulation, or stricture of the intestines, by volvulus, or twisting of the gut, or some other cause. Under these circumstances, as life is endangered, it has been proposed to cut down upon the seat of the obstruction, and remove its cause. This operation has been frequently performed, and often followed by relief. If the foreign body has caused so much irritation as to occasion abscess, this should be freely opened, and the body removed. Where the seat of obstruction can be certainly determined, we should make the incision directly over it, proceeding as directed below.

Where the seat of obstruction cannot be discovered, a longitudinal incision should be made in the linea alba, about three inches long, and carried down to the peritoneum; this membrane should then be very carefully opened, and the opening enlarged by passing the left index finger through the wound, and slitting the membrane up with a probe-pointed bistoury directed thereon. As soon as the membrane is opened, the small bowels are apt to protrude, and should be carefully drawn one side, and held in a soft towel by an assistant. The surgeon should then carefully seek the obstruction. If this should consist of an invagination of the intestine, the invaginated portion should be gently drawn out, and the whole returned into the abdomen. If the bowel is occluded by a hernial constriction, the constricting bands should be as carefully divided as possible, by a probe-pointed bistoury well guarded, or the loop of intestine gently drawn out from the opening in which it has been caught. If it be a case of volvulus, the gut should be untwisted, and all returned into the abdomen; and the external wound must be closed by the continued suture, and allowed to heal. Should the difficulty arise from a foreign body, this should be removed through a longitudinal incision along the convexity of the gut, and the case then treated as one of wounded intestine.

Where a foreign body lodges in the *stomach*, and so causes danger to life, it has been proposed to remove it by cutting down upon and into the stomach. The operation has indeed been performed, but so seldom that it is as yet impossible to decide as to its expediency. Gastrotomy has been performed in the following manner. The patient being put on a high table with his legs hanging over at one end, is put fully under the influence of chloroform. The surgeon then takes his position between the patient's legs, and carefully examines the region of the stomach. If the body has by its irritation caused abscess, or if it be undoubtedly felt projecting at any point in the stomach, the incision should be made directly upon it, as it is very likely that it has already occasioned sufficient inflammation to cause adhesions to be formed; and here also the incision should be made in a longitudinal direction. If the position of the body cannot be discovered, a longitudinal incision should be made in the linea alba, three inches in length, and down to the peritoneum; this membrane must then be very carefully opened, and the opening enlarged by passing the left index finger through the wound, and slitting the membrane up with a probe-pointed bistoury directed thereon. If the transverse arch of the colon should present itself, it must be gently pushed down, and the anterior surface of the stomach will be reached; this should be cautiously opened, and great care taken not to prolong the incision to either curve, as by so doing the coronary arteries might be wounded. The body being removed, the wound must be treated as a wound of the stomach from any other cause. Erichsen has suggested, that some instrument might be invented, by which foreign bodies in the stomach might be seized and removed through the throat and mouth, and reminds us of the fact that jugglers sometimes introduce instruments of large size into the stomach by throwing them very far back. The suggestion is a good one, but experience alone can determine upon its practicability.

Cæsarian Section.

It sometimes happens that the female pelvis is so much contracted, by disease affecting the bony structure, from accidental causes, or as the result of congenital malformation, that it becomes impossible for a full grown fœtus to be forced through the natural passages, even though it be dissected completely in utero. When every means is known to be unavailing, and neither manipulation, skill, the use of instruments, nor even embryotomy, can possibly remove the fœtus, the *cæsarian section*, or the opening of the uterus by incision through the abdominal walls, offers the only resource. Under these circumstances, the patient, having emptied the bladder thoroughly, is placed on her back as though for gastrotomy. The center of the linea alba is then marked with a line of ink from a little above the umbilicus to the pubis. The patient is then placed under the full influence of chloroform, and an assistant on each side pressing the uterus gently but firmly against the abdominal walls, causes the intestines to fall from between it and them, and continues this pressure until the operation is completed, and the wound closed. The incision should be commenced just above the navel, in the centre of the linea alba, and carried downwards in the same line to about two inches from the pubis, care being taken by the assistants to keep the uterus in close contact with the abdominal walls, as there is a constant tendency of the small bowels to escape through the wound. The cavity of the abdomen having been opened, the uterus at once presents itself, inclining generally a little to one side. If this obliquity be great, the organ should be gently straightened, and held by an assistant in its proper position. An incision should then be made, by several successive strokes of the knife, through the walls of the uterus, directly in its mesial line longitudinally, from above downwards, and extending to some depth. A director, ending in a pointed bulb, is then carefully passed through the remaining tissues, and the opening in the womb extended thereon. Thus far there is apt to be but little hemorrhage, and the womb can generally be opened immediately. Should hemorrhage, however, follow the incision through the abdominal walls, this should be checked before going farther. The length of the opening made in the womb must depend on circumstances. It should be large enough to fulfil the object for which it was intended, without any risk of lacerating the part, and should be no larger than will be essential for that purpose. The uterus being opened, the membranes ought at once to be ruptured by the hand, and the waters be permitted to escape. Some part of the infant will then immediately present itself; and its body being grasped by the surgeon, it should be drawn through the wound, and removed sufficiently to permit the cord to be divided; which should be done by the usual method. At this stage of the operation, the bleeding is apt to be profuse; and great care should also be taken by the assistants to keep up the pressure over the abdomen, and keep the bowels out of the wound. It has been much debated, whether the cord should now be returned into the uterus, the wound closed, and the secundines left to be delivered through the natural passages, or the placenta at once detached, and all removed together through the incision. It appears best, however, at once to introduce the hand, gently but quickly detach the placenta, and at once to empty the womb through the artificial opening.

Should the line of incision through the uterine walls fall directly over the seat of attachment of the placenta, it has been advised, either to cut through the placenta and proceed as in other cases, or to disengage and deliver it before, or simultaneously with, the fœtus. The latter procedure appears much the best; as by it much bleeding will be prevented, and the tedious process of dividing and afterwards delivering the placenta, avoided. After the operation the womb rapidly contracts, and in fifteen or thirty minutes will have regained its natural size; when the tendency of the bowels to escape through the wound will have greatly lessened. Skey recommends "a circular bandage of about nine or ten inches in breadth, divided across the middle, and the cut edges connected by about a dozen strong silk threads of eight or ten inches in length," to be passed around the patient's body before commencing the operation. As soon as the hemorrhage has ceased, and the womb is well contracted, "it is to be drawn down over the abdomen, and held tightly by two assistants. It will be found to form an excellent temporary substitute for closure of the abdominal wound, while it permits free manipulation between the threads, in the passing of the sutures." The wound in the abdomen should not be closed until all hemorrhage has ended, and the uterus is firmly contracted. If kept open a few moments unnecessarily, no evil will result therefrom; but if closed too soon, the patient is exposed to the most fatal form of hemorrhage, that which is concealed. As soon as all bleeding has ceased, the wound in the uterus should be observed, that no part of the bowel may have been caught therein and left there; and the os uteri must be also examined, to discover that it is open. The wound in the abdomen should then be closed by sutures, sufficient in number to secure the perfect contact of its entire edges, with the exception of about a half inch of its lower end, which should be left open for the escape of any discharge that might occur.

The after treatment should consist of measures calculated to allay irritation, and support the vital energies. Anodynes, to check restlessness and relieve pain, and opium for the same purpose, and to arrest inflammation, with generous diet, will be the proper treatment. Depletory measures should be strictly avoided.

It is out of the question to enter into an extended history of this operation here. I can only add, that it is quite an ancient one, and was far more frequent some time since than now, embryotomy being now preferred in many cases in which cæsariotomy would formerly have been performed.

The success of this operation has varied greatly, with different surgeons, and in different countries. In America it has succeeded in a very reasonable proportion of cases, while in Europe, and in Great Britain particularly, it has been nearly always fatal. The reason for this difference appears to be, that among us, the operation when performed, is generally resorted to early, and before the depressing influence of long-continued suffering, exertion and anxiety, have so exhausted the patient as to render reaction, after the shock of a severe operation, impossible. In Europe, on the contrary, cæsariotomy is postponed to the last moment, and seldom performed until the patient appears beyond all chance of recovery. It has often failed, therefore, because undoubtedly performed too late.

If the operation is to be performed at all, it should not be put off a moment after labor has set in, as nothing can possibly be gained by delay, and success is almost ensured by operating promptly, while the patient is mentally and physically fresh and vigorous. Let it be remembered, however, that the operation is only justifiable in such cases as *cannot possibly be relieved by other means*. Let the proportions of the fœtal bulk and the pelvic capacity be well understood and carefully compared; and when the disparity becomes so great as to render the passage of the one through the other impossible, then it becomes our duty to resort to cæsariotomy, and equally our duty to operate early, and promptly.

Ovariotomy.

Although ovarian dropsy is by no means a painful or fatal affection, yet it is so troublesome that it was long since proposed to put an end to the disease by the removal with the knife of the entire cystic tumor.

Much discussion has existed with regard to the propriety of this operation. Some surgeons contended that it should never be resorted to, because it seldom or never, was followed by perfect relief, and was not applicable to all cases, while there was no known means of distinguishing beforehand, whether a case was suited to the operation or not, it frequently happening that after the first incisions were all made, and the most painful part of the operation was over, the surgeon discovered that the cyst could not be removed; and so was obliged to discontinue the operation. This objection, however, can only apply to doubtful cases; and while it is true that ovarian cysts seldom cause acute pain, yet, it has been well observed, that so great a degree of distention as is frequently found can scarcely exist without causing a vast amount of discomfort, amounting in some cases to actual pain. And while this affection can but rarely, if ever be said truly to cause death, yet it is impossible to believe that such a condition as is exhibited by one who has suffered for any length of time from this disease, can be compatible with longevity; nay, it must in every case shorten life.

It has been observed, that where the operation has been undertaken, the abdomen opened, and the tumor exposed, but found unfit to be operated upon from being adherent, the external wound heals without difficulty, and no unpleasant symptom results. The operation is adapted to those cases in which no adhesions have been formed; and the most favorable tumors for removal are those composed of a single cyst containing clear serum. In such cases the operation has seldom failed to give relief, provided they have been subjected to no previous irritation, by which adhesive inflammation may have been excited, as bandaging, tapping, &c.

Before the operation, the bowels should be emptied by a cathartic, followed immediately before the incisions are commenced, by an enema, and the emptying of the bladder with the catheter. The patient should then be placed on her back upon a table, with her head and shoulders slightly elevated, and her legs hanging over the end of the table. Chloroform having been given, the operator takes his position between the subject's legs, commences just below the navel, and carries an incision through the abdominal walls downwards towards the pubis, following the center of the linea alba, and from three to five inches long, acccording to the size of the tumor. The cyst thus exposed should be "seized with a strong pair of hooked forceps, with pointed and projecting teeth; by means of which the sac should be firmly held. As the fluid flows off, both the cyst and the prominent abdomen become reduced in size, and the former gradually elongating, is drawn without effort through the wound." (Skey.) If the cyst be multilocular, each cyst must be seized and its contents evacuated, as it comes into view; when they can without difficulty, be gently drawn out at the wound until their root appears therein. Should this be prevented by adhesions, or if the tumor be solid, the hand must be introduced, the adhesions carefully and gently divided, and the tumor drawn towards the opening. If the adhesions can not be divided with safety, the contents of the cyst should be drawn off, and the cyst divided as near the adhesions as possible. After being emptied, the cyst will with ease be drawn out at the wound, if not prevented by adhesions. Erichsen advises, that the tumor should be drawn well forward, and "the pedicle transfixed by a nevus needle armed with strong whip-cord, which being tied on either side, the pedicle should be divided above it." Care must be taken that the needle does not transfix an artery or vein. To avoid this, the pedicle of the tumor should be untwisted, as it were, and carefully examined before it is pierced by the needle.

Before tying the ligature it has been advised to dissect the peritoneum from that part of the tumor about to be constricted. In doing this, great care is requisite to avoid wounding any of the vessels, and particularly the viens, which are very numerous and covered by very thin walls. In this way the chances are much lessened of any slough of the pedicle falling into the cavity of the peritoneum, and thus the risk of peritonitis is diminished. Erichsen, from whose work this account is chiefly drawn, adds, "I attribute much of the success that attended the removal of an ovarian tumor, partly solid and partly cystic, weighing about fifteen pounds, which I recently extracted from a lady sixty-five years of age, to the adoption of this precaution." The pedicle should be divided about half an inch above the ligature. If severed nearer than this it will retract, and slipping from under the ligature give rise to secondary hemorrhage.

The abdominal wound should be closed by the interrupted suture, over which broad and long strips of adhesive plaster should be fixed, and a laced bandage should be constantly worn around the body. The patient should be kept perfectly quiet in bed; nothing but ice and barley water, or some such liquid, should be allowed for a day or two; and she should be kept constantly under the influence of opium, and in a chamber the temperature of which must constantly be kept at rather a high point. About once in six or eight hours, the urine should be drawn off with a catheter; and the bowels must be kept quiet, if possible, for at least twelve hours; after which an enema may be given; but active medicine must be strictly avoided. If peritonitis should occur, it must be treated precisely as the same affection following the operation for strangulated hernia. It is a matter of some moment, to prevent any part of the pedicle from sloughing, and falling into the cavity of the abdomen, after it has been ligated. With this object in view, Erichsen has advised, that an ordinary hair-lip pin be passed through the lips of the abdominal wound, near its lower edge; and that the pedicle after its division be drawn forward, and attached to the pin by wrapping around it the strong ligature by which the pedicle was transfixed, in the usual form of a figure-of-eight. The patient should lie on her back, with the head and shoulders slightly elevated, the legs flexed by pillows under the knees, and the abdominal muscles kept perfectly relaxed. All depletory measures must be strictly avoided; and, indeed, the case must be treated precisely as one in which cæsariotomy has been performed. T. S. W.

LECTURE LXII.

ABDOMINAL HERNIA.

Definition of Hernia—Inguinal Hernia—Crural or Femoral Hernia—Umbilical, Thyroid, Ischiatic, Perineal, Vaginal, Diaphragmatic Hernia—Hernia of the Linea Alba—Ventral Hernia—Intestinal Hernia—Epiplocele—Entero-Epiplocele—Bubonocele—Oscheocele, or Scrotal Hernia—Reducible Hernia—Irreducible Hernia—Strangulated Hernia—Internal Strangulated Hernia—Causes of Hernia.

We have, this morning, gentlemen, to enter upon the discussion of a very important subject, viz: *abdominal hernia.* When any organ, naturally occupying a cavity, protrudes from that cavity, we call such protrusion a *hernia.* Thus we have hernia of the *brain,* and of the *lung;* and so far as the abdomen is concerned, we have *abdominal* hernia.

This affection considered in all its bearings, may be divided into several varieties. In the first place, we divide it according to the point at which protrusion takes place; and, when we refer to these numerous points, we find that at some, the abdomen presents natural outlets, of which we shall speak more particularly as we proceed. Besides these, we have similar protrusions, taking place sometimes where there is no natural opening, as through the linea alba, and in other situations.

We may also have an organ belonging to one cavity protruding into another; an abdominal organ into the thorax, for example; or the omentum or intestines into the vagina, &c.

But let us go on to consider these numerous varieties. One of them, and the most frequent, is where the protrusion takes place at the *inguinal ring.* This constitutes *inguinal hernia.* Another variety is, where the hernia passes under Poupart's ligament, through the *crural ring.* Here we have *crural* or *femoral hernia.* Again, and especially in newly born infants, you will find cases in which, from a want of the proper development of those structures forming the umbilicus, there is a protrusion on the median line, through that opening. This is called *umbilical hernia.* Again: from an imperfect development of those structures which naturally close the obturator or thyroid foramem, we have sometimes a protrusion there; and to this variety we apply the name of *thyroid hernia.* In another class, from similar causes, the organ having passed backwards and downwards, protrudes at the ischiatic opening, and we have *ischiatic hernia.* Again: from a want of development, a portion of intestine may protrude directly into the perineum, in the neighborhood of the anus, and form a *perineal* hernia; and in the female we may also have a protrusion along the vagina, constituting a *vaginal* hernia. In the openings which exist through the diaphragm, we sometimes find a protrusion upward, giving rise to what we denominate *diaphragmatic* hernia; and again, we may have a protrusion along the median line of the linea alba, at the point of the interlacement of the fibres; and this will be a *hernia of the linea alba.* Besides these, there are other cases in which the hernia arises from some fault in the walls of the abdomen, either from a want of development, or from some injury. The protrusion may be on one side, or on the other, high up, or low down. To this form, the term (though improper) of *ventral* hernia is applied.

You will thus perceive, that by considering the various points at which hernia may take place, we have a number of varieties. There are, moreover, varieties dependant on other considerations. In the first place, we may divide them in reference to the organ protruding. Some cases are found to contain intestine only, and are called *intestinal hernia,* or *enterocele.* Others contain omentum only, and therefore are called *omental hernia, or epiplocele.* We very frequently find hernia to consist of both omentum and intestine. We apply to this variety, therefore, the compound term *entero-epiplocele.*

We find, generally, that the floating intestine is the portion involved in enterocele, though occasionally we even have the cœcum and colon protruding. Sometimes, and especially in cases of long standing, we may find every organ contained in the abdominal cavity involved. Portions of the liver, of the spleen, &c., may be found in the sac.

Again: turning our attention to the circumstances connected with the hernia, we find several varieties, founded on the extent to which the organ has protruded; and particularly is this the case, in inguinal hernia. Here, when we find the tumor above the ligament in the groin, we call it *bubonocele.* But when the hernia has existed longer, being constantly inclined to descend, it passes gradually down into the scrotum, having the testicle behind it; and at this stage we call it *oscheocele* or *scrotal hernia,* and so on, through many varieties.

In a large number of cases we find, that, though while the individual is in the erect position the tumors exists, yet as soon as he is placed in the horizontal position, the organs return spontaneously, or may be easily returned by manipulation, to their natural cavity. Such a case is called a *reducible* hernia. It very frequently happens, however, that where a hernia exists for a long time, the portion of peritoneum that accompanies it takes on inflammation; plasma is thrown out, and the tumor becomes so firmly united to surrounding organs, that it can neither return spontaneously, nor be reduced by any manipulation; and yet the intestine may be so situated, that this will not interfere with its natural functions. To this form of hernia we apply the term, *irreducible.* Be careful not to confound this with another form of hernia, which, though irreducible, is so from a totally different cause; and it now behooves us to consider in what this difference consists.

We frequently find, that where a hernia has been for a long time reducible, it suddenly becomes irreducible, from a stricture at the abdominal opening, so tight and unyielding that gas even cannot pass, and mortification soon takes place. It is highly important that you should not apply the term *irreducible* here; for this is what we denominate *strangulated* hernia. Such a condition is always serious; for the stricture not only prevents the passage of gas and feces, but also of blood; and a violent inflammation, soon running on to mortification, is the result. Some surgeons have proposed to divide this form of hernia into two varieties. The most trivial they denominate *incarcerated,* and the most serious *strangulated* hernia. These varieties differ in degree only. By *incarcerated* hernia, is meant that state in which the organs cannot return, but in which circulation still goes on. There is a distended state of the intestine, which prevents its return, and causes some constriction. Here, by cautious manipulation, we may succeed in pressing the distending matter into the cavity, and in returning the organ. There may have been some inflammation caused by the strangulation; though this should not prevent you from returning the organ, as it will soon subside, when everything is again placed in a natural position. When, however, there has been a perfect stricture; when we cannot empty the sac of its contents, and violent inflammation seizes the organs; then, to all intents and purposes, we have *strangulated* hernia. If this condition is not speedily relieved, such serious mischief will have taken place, even in a few hours, that death must sooner or later result.

By way of appendix I may add, that sometimes we have strangulated hernia *internally*. This may occur in some one of the following ways. A small aperture may form in the mesentery; after some time, a small piece of intestine may insinuate itself into this opening; and this may gradually increase, until a considerable fold, or knuckle, passes through; and the patient is destroyed by mortification from strangulation. Again: from the interlacing of the numerous adventitious bands of attachment which sometimes form here, the intestines may become inserted in some one or other of them; and sooner or later the patient dies of strangulated hernia. Death has frequently occurred from this cause. Such was the case of the lamented Legare, who unfortunately died too soon for the good of his country.

Such are the numerous varieties of hernia. All of them are of importance, in a practical point of view.

As to the *causes* of hernia, it is convenient to divide them, as usual, into *predisposing* and *exciting*. The predisposing are inborn as it were, and appear to be frequently inherited. So far is this the case, that we sometimes find it as a kind of heritage in families. When we come to consider the nature of this predisposition, we find, that it sometimes consists in the want of a proper development of some of the structures, surrounding and closing the different outlets; while, in other instances, the predisposing condition is the result of some accident or disease, which so weakens the parieties of the abdomen as to give rise to these protrusions. Sometimes, a *wound* penetrates the cavity of the abdomen; and, notwithstanding it has healed kindly and quickly, it will very frequently happen, that hernia, at some future time, will take place at the cicatrix. It is also the result, in some instances, of *operations* for the removal of tumors, and I might go on to mention numerous other predisposing causes.

With regard to the *exciting* causes, I need not say much, since they are quite obvious. All violent action of the abdominal muscles, as lifting weights, &c., particularly where a predisposition exists, may bring about a hernia. I have seen hernia in children, produced partly by the influence of position, and partly by the use of a toy, called a velocipede. A boy placed astride of this hobby-horse is compelled to use both feet, while the abdominal muscles are relaxed; and thus may be entailed upon the child the horrible infliction of an inguinal hernia. Riding in vehicles, where the abdominal muscles are in a state of relaxation, is frequently an exciting cause. Not so, however, in horseback exercise; for in this position every muscle in the body is brought into action.

I would mention, in conclusion, as among the exciting causes, every thing which may cause a pressure upon the abdomen; as clothes tightly buttoned, and, in a very fair proportion of cases, the use of stays. This practice is also, not unfrequently, a cause of another deplorable condition, viz: *prolapsus uteri.* These stays, or corsets, force the organs down towards the outlet, and cause them, either to escape through the ring, or to press upon the brim of the pelvis. Under these circumstances, or I should say by means of this barbarity, the female often, in the very bloom of life, has entailed upon her the misfortune of a prolapsus uteri. It is not, however, with this effect of the practice that we have now to deal. Lacing, if properly conducted, would not lead to such evil results. If, instead of extending only to the umbilicus, it passed down to the pubis, and was properly fitted to the spine and to the abdomen, it might even be productive of good. It is upon these short jackets—these useless, unmeaning things called *stays*, that I would pronounce my anathemas. The practice of wearing them is one which should be denounced by every physician, and from them should receive no quarter, until it is extirpated from the land. Many of those *head-aches,* miscalled *nervous,* find *here* their cause. They keep up a constant pressure upon the vessels and organs of the parts which they cover, and lay the foundation of mischief, for which art can afford no remedy.

LECTURE LXIII.

HERNIA CONTINUED—ITS DIFFERENTIAL DIAGNOSIS—INGUINAL HERNIA—SCROTAL HERNIA—CRURAL HERNIA—THYROID HERNIA—PHRENIC HERNIA—TREATMENT OF HERNIA—BY TRUSS—VARIETIES OF TRUSS.

It may be proper, gentlemen, before proceeding to the treatment of hernia, to make a few remarks on its *differential diagnosis;* to say something of its *symptoms*, and, especially of those by which we distinguish it from other diseases.

An *inguinal* hernia, which has not yet descended far, having just escaped through the ring, will appear thus. You will find at the ring a smooth, round, elastic tumor, while the patient is in the erect position; but it will return into the abdomen on his assuming the recumbent one. You will find, moreover, that on slight *pressure*, the tumor will also disappear, and the contour of the external ring be very perceptible. You will have to distinguish this from tumors in the groin, abscesses, and a varicose condition of the veins, particularly of the superior epigastric. I have frequently seen this vein so enlarged as to cause a large tumor; and such a tumor may be mistaken for inguinal hernia. But, by its easy reduction, by the return of hernia as soon as the recumbent posture is assumed, and by the absence of all hardness, you may distinguish it from other tumors in these parts. *Abscesses* do not disappear on pressure, are unaffected by position, and fluctuate; and are thus easily distinguished. But where hernia descends into the scrotum, becomes very large, and is of long standing, then circumstances may arise to cause a difficulty in the diagnosis. An enlarged scrotum may be caused by *hydrocele*, by a *varicose* condition of the *cord*, by *hydetids*, and so far as feeling is concerned, may be mistaken for hernia.

Let us see how to distinguish them. In the first place, so far as the rise and progress of hernia and *hydrocele* are concerned, they are diametrically opposite. In *hernia*, if we trace the disease backward, we find that first, it commences in the *groin*, and then *descends* gradually, until it is seated in the scrotum. In *hydrocele*, on the other hand, we find that it begins in the *scrotum*, and gradually *ascends*, as the tunica vaginalis becomes enlarged, to the ring. But this is not all. If you take the tumors in the hand, you will find that they differ in feeling. In *hydrocele*, until it becomes very large, the tumor is of a pyramidal shape, large below, and gradually tapering up towards the ring; and if you seize it in the palm of the hand, and draw it downwards and forwards, so as to stretch the spermatic cord, there will be no enlargement at the ring. In *hernia*, exactly the reverse takes place; for although the tumor is large below, and tapers upward, instead of ending above in the cord, you find it still large at the ring. It is true, that in some cases of old hydrocele also, this condition exists, from some of the fluïd mounting into the inguinal canal; but there are other circumstances, which enable us to distinguish more accurately. In reducible inguinal hernia, upon placing the patient on his back, the omentum or intestine will spontaneously pass up; or, if it does not do so, on seizing with the hand, and kneeding it, it will easily be returned. Now, in *hydrocele*, no pressure can possibly force the liquid into the abdomen; and thus you may easily distinguish it. Again; except in old cases, where the structures are thickened, hydrocele is *transparent*, and may thus also be distinguished from hernia. There are some cases, however, which are exceedingly obscure; as, for example, where hernia becomes engrafted on hydrocele. You will meet with such cases, and you will find them exceedingly embarrassing; but, by bearing in mind the peculiar gurgling sound made by hernia when reducible, and the fluctuating of hydrocele, you will be able, almost always, to distinguish them.

Again: we are liable to find in this part a *varicose* condition of the spermatic *cord*, which "*varicocele*" sometimes becomes so large as to form a tumor in the scrotum. This condition I have known, again and again, to have been treated (by able surgeons, who should have known better,) with a truss, thus making matters a great deal worse. Now, when you seize such a tumor in your hands, and roll it between the fingers, you will readily distinguish the varicose condition, by a peculiar, knotty feeling. But this is not all; for placing the patient on his back, the tumor gradually subsides; so that, in this respect, it might be mistaken for hernia. But, in the varicose condition, if you place the thumb across the cord, where it glides over the pubis, notwithstanding you thus close the abdominal ring, the tumor will return on the patient's again standing up. The reason is, that in this case the tumor is formed by venous blood ascending; and, therefore, the thumb offers no impediment to its re-formation. In hernia, after it is reduced, the tumor cannot form again, unless the pressure is removed. By bearing this in mind, we can easily distinguish hernia from varicocele.

As regards *cancerous degenerations*, &c., there can be no difficulty. They are hard, and frequently knotted; and, more than all, if you draw down the tumor, you will find that the ring is occupied only by its natural contents.

I say, then, that by bearing all these things in mind, you can easily distinguish inguinal hernia from those affections with which it is liable to be confounded.

By a similar process you may distinguish *crural* hernia. This is likely to be mistaken for tumors in the groin, for psoas or lumbar abscesses, and more than all, for varicose conditions of the femoral or saphena vein.

In crural hernia, the tumor is generally small and easily reduced. It may be distinguished from abscess, by the latter being irreducible, and by the peculiar characteristics of abscess. Yet I have seen a case of this kind mistaken for hernia, and that, too, by a distinguished hospital surgeon. The patient was actually made to put on a truss, which I found him wearing, when my turn of duty came round. I diagnosticated a psoas abscess; and the truth was, that the patient labored under caries of the lumbar vertebræ. Now, if you will bear in mind, that crural hernia protrudes between the femoral vessels and the pubis, and below Poupart's ligament, you will not confound it with any tumor external to the vein. *A varicose condition of the vein* will return, notwithstanding pressure be made over the pubis; and, in addition to this, the tumor is not always found in the same position, but may, even where the saphena vein is concerned, extend as low as the knee; while also, in some thin-skinned persons, it may be detected by the peculiar color. If you attend to all these circumstances, you cannot possibly mistake crural hernia for any thing else.

As regards hernia of the diaphragm, or *phrenic hernia*, hernia of the *thyroid foramen*, &c., you are to be guided by the same general principles. A hernia through the *thyroid foramen*, from the thickness of the muscles by which it is covered, may escape notice at first; but if it be large, it will soon push these aside and make its appearance. With regard to *phrenic* hernia, as it escapes into the thorax, of course the diagnosis is extremely difficult. But where a large amount of bowel has passed into the thorax, we can suppose a case where the physician may diagnosticate it; but this is very difficult; and even when he thus succeeds, art, unfortunately, can afford but little chance of relief.

Let us next consider what is the surgeon's duty in cases of hernia.

In entering upon the *treatment* of hernia, we have an exceedingly wide field before us; and, to understand it, we must bear in mind all that was said yesterday.

I shall begin with ordinary *reducible hernia.* Here the treatment is simple. But because simple, it must not be regarded as unimportant; for any individual laboring under reducible hernia, is liable, at any time, to such circumstances as shall place his life in jeopardy; and though the tumor be small at first, and gives but little inconvenience, yet it is constantly inclined to increase, and may become so enormous as greatly to impede the motions of the sufferer. It becomes necessary, then, that you should observe every precaution, and at once take such steps as shall guard your patient against any increase of his malady. It is true, that where hernia is perfectly established, a radical cure is extremely difficult and doubtful; but it is also true, that by taking the disease in the beginning, and while the patient is young, we may effect a radical cure; or, if we cannot cure the hernia, we can so protect, and guard against its evil effects, that it shall cause but little inconvenience.

The indications are, to return the hernia into the abdomen, and to keep it there. With regard to its return, all that is necessary, in reducible hernia, is to place the patient on his back; when, by slight manipulation, the organs will be easily returned into their cavity; and the patient before rising should put on a truss to retain them there. These trusses are exceedingly numerous in kind. Most of them have a spring, as a fundamental part, with a pad to press on the ring. The spring should pass round the side opposite to the hernia; and the pad should be placed immediately over the ring. These pads are made of several different substances, such as glass, leather, horn, wood, &c. The glass pads are preferable, as they are less liable to excoriate the surface.

A truss which is very much used in this country, is that of Hull. It consists of a spring, and two pads, one of which is placed over the sacrum, and the other over the ring. To prevent slipping up, a perineal band is added. The truss must be carefully adjusted, so as not to allow the pad to come below the upper margin of the pubis; for it would then press on the cord, whereas it ought barely to press on the ring, and not touch the pubis at all. The object of some of these trusses is, (the pad being of wood,) to produce such inflammation, as shall cause the obliteration of the ring, and prevent the future escape of the hernia. In a young subject, this may succeed; but in ordinary cases, where the hernia has been of some duration, the glass pad truss, from Reinhardt, of this city, is a very good one, and has the advantage of being made so that it may be adjusted to either side. The variety of trusses exceeds enumeration. It is my object, however, only to give general rules. Where the hernia exists on both sides, a truss which has two pads must be used. Some are so arranged that the springs pass above the penis. In some cases, particularly with negroes, it is difficult to keep the truss on. Under such circumstances, I use a common leather strap, about an inch and a half wide, having a buckle at one end, and holes at the other. Over this end, slides another strap perforated with a hole; and another short strap is added, having a buckle, under which is the pad. This second strap is applied to the perineum. With such an adjustment, I have for many years treated hernia successfully, particularly in the laboring class, for here either they will not wear the truss, or it moves. Now this cannot move; for being inelastic, it does not yield.

There are a variety of other expedients proposed for the radical cure of hernia; but it cannot be necessary to go into a minute discussion of them all.

In *umbilical* hernia, we use a truss, consisting as before of a spring and pad. A common girdle with a pad of leather, or cork, or a bit of wood folded in cloth, makes a very good apparatus.

Although you may not effect a radical cure of hernia, by these means, yet you may very much modify its evil effects; and if the patient will constantly wear the truss, he will be relieved from much inconvenience, and from all danger of strangulation. In our next lecture we will continue the subject.

LECTURE LXIV.

HERNIA CONTINUED—RADICAL CURE OF HERNIA—INCARCERATED AND STRANGULATED HERNIA—TREATMENT.

At our last meeting, gentlemen, we had under consideration the diagnosis and treatment of common reducible hernia. We stated that our chief reliance was placed on the mechanical means of retention; and that, when the patient was young, such means were available, not only in retaining the hernia, but also in preventing that enlargement of the opening, which would otherwise occur, and which would always render the liability to a return much greater.

We also stated, that by the early use of a truss, in some instances a cure might be effected; and that to facilitate this result, it had been proposed, especially in later years, to make the pads of some hard material, in order to excite such a degree of adhesive inflammation in the part, as would lead to the obliteration of the opening. Various instruments have been invented for the fulfilment of this purpose; but, so far at least as a radical cure is concerned, all means of treatment must be regarded as very uncertain.

I would now remark, that steps far more bold have been taken; expedients far more formidable have been resorted to. In older times, even the operation of *castration* was in some cases tried. If you understand the nature of the affection, you must at once perceive that such a course would be of no avail. In modern times, other and more plausible methods have been recommended. Some have proposed to open the abdominal walls at the hernial aperture, return the gut, and effectually close the wound.

Another expedient of recent origin is, a kind of auto-plastic operation—the dissecting up of a flap, and the securing of it in the ring, so as to block it up. Now, this possibly may succeed; but I am free to confess, that I entertain great doubt of its practicability. I know of one case in which the operation resulted fatally.

Considering all the circumstances, therefore, I would not recommend either of these measures; but would advise you to rely on the persevering use of the truss. To these expedients I might add many others having the same object in view:—as puncture of the sac, and injection of tincture of cantharides, tincture of iodine, &c.;

the intrusion of a portion of the integument into the ring, by a blunt, hollow, wooden instrument, shaped like the finger, but perforated with small openings on the side, for the passage of a curved needle, mounted on a stylet, designed to convey a ligature, by which the glove-like process of the skin is secured in situ, until adhesion has taken place; the sutures and corks of Belmas, &c.

We must go on now to consider our subject in a different point of view. I have remarked that the hernia is liable to become so fixed in the sac, as to render its return a matter of more or less difficulty. This condition is sometimes designated as an *incarceration*, and sometimes as a *strangulation* of the hernia. In some instances it is difficult to draw a distinction between an *incarcerated* and a *strangulated* hernia, as the difference is one of degree only. In the former condition there is, according to the amount of constriction, more or less inflammation of the part, more or less restlessness, with vomiting, anxiety, &c.; but the accident has not proceeded so far as to produce mortification. Such are the phenomena which characterize an *incarcerated* hernia. But when there is a still greater constriction at the hernial outlet, and the circulation of the part is seriously interfered with, or arrested, there is always great danger of gangrene, and we have a case of *strangulated* hernia. The tumor becomes tense, painful to the touch, and sometimes discolored. The bowel becomes soft, fragile, and distended with gas; and even a rupture of the gut may occur, especially if it be roughly handled. Black, isolated spots of gangrene may be developed on the surface of the intestine, and its contents may, in that way, be emptied into the abdominal cavity, and thus hasten the disastrous result. When the stricture first comes on, as it may after unusual exertion of any kind, the patient experiences a sensation of pain in the part, and he finds the tumor more tense than usual, and more sensitive. He tugs at it; handles it rudely in his attempts to return it; and, in that way, increases the danger. Sometimes the symptoms follow each other more rapidly than at others. The stomach becomes irritable; small watery evacuations are discharged; the pain becomes more diffused; great restlessness supervenes; gaseous accumulation takes place in the tumor; and the abdominal walls become more rigid. The bowels, in some cases, are soon violently obstructed; but often, if enemas have been administered, and sometimes even without them, feces may pass. These, however, come from below the seat of the hernia; and once the contents of that portion of the intestine have been discharged, no more fecal matter makes its appearance, the evacuations consisting then of nothing but mucus. As the case continues, the symptoms increase in severity. Violent inflammation has now seized upon the sac and the neighboring peritoneum. The patient becomes confused; the pulse is more and more accelerated; the skin becomes cold and clammy; and the efforts at vomiting are more frequent, and more violent. An inverted action of the intestines may now be induced, and fecal ejections from the stomach mark the violence of the symptoms. By this time, the sufferer begins to be still further annoyed by the supervention of hiccups; profuse, cold, and clammy sweats cover the surface of the skin; the pulse flutters, and is soon reduced to a mere thread in volume; unless speedy assistance be rendered, the vital forces yield to the morbid complications; and all may be over in a comparatively short space of time. Six, twelve, or twenty-four hours may suffice to do the whole.

Such, then, is a *strangulated hernia.* And, when we consider this picture, and recollect that it is a disease which runs immediately to its termination, giving you no time to seek assistance, I need not say how important it is, for you to be thoroughly prepared for the emergency. It is impossible for you to attach too much importance to a knowledge of the anatomy of hernia. This is a tumor that cannot be rashly cut into, and the anatomy of the part should be thoroughly understood, before the performance of the operation for its relief, when it is strangulated, can be thought of. And no practitioner can be excused on the plea of ignorance. He who suffers his patient to die before him, on account of his inability to operate; and then affirms that the death has resulted from *colic*, or from *inflammation of the bowels*, is a disgrace to his profession. This operation of all others, should be thoroughly understood. And in this connection I would make one more remark. The performance of the operation for the relief of strangulated hernia, has been held up to the student of medicine as a kind of bugbear, as exceedingly difficult, though highly important. It *is* highly important, but *not* exceedingly difficult. It is true that modern surgery has greatly complicated the subject; but if you bear in mind the anatomical relations of the parts, there is no difficulty whatever in operating; in cutting down cautiously, layer after layer, so as to be sure of what you are about, till the seat of stricture is reached; in inserting the finger and making the proper incision in the constricted part; and in returning the liberated gut into the abdominal cavity. Yet this operation is the bugbear which is held up by the world to frighten the young surgeons; and, in some instances, I am sorry to say, to deter them from the performance of their duty, and to induce them to conceal the true cause of the death of their patient, by affirming that he died "of *colic*" or "of *inflammation of the bowels.*"

But let us return from this digression, which the importance of the subject appeared to demand of me.

I would not have you infer, that all cases, even of strangulated hernia, require the knife. There are other expedients which may prevent the necessity of a resort to the performance of the operation. Let us then endeavor to understand the *causes* inducing, and the *circumstances* attending, a case of strangulated hernia, in order the better to understand the methods of relief. There is, as the essential condition, a *stricture of the orifice* through which the intestine has passed. But this stricture cannot always be said to be of a spasmodic character. The cause of the constriction is often dependant as much on the misplaced organ, as on the walls of the outlet. Gas and feces may accumulate, and preternaturally distend the sac of the hernia, forcing against, and thus constricting the edges of the opening; and this may go on, till the whole, or a portion of the circulation is arrested at the margin of the ring. Then follow the symptoms I have been describing.

Now let us attend to the various methods to be adopted for the relief of the patient, bearing in mind the condition of the parts. In the first place, it will be right to try the taxis; that is to say, the judicious manipulation of the part, with the view of attempting to empty the intestine of its contents, and return it into the abdominal cavity. The patient should be placed on his back, and in that position which will most tend to relax the abdominal and femoral muscles, Poupart's ligament, and the parts about the neck of the tumor. The head and shoulders should be slightly elevated; and the thigh should be flexed on the pelvis, and inclined to the opposite side, in order to relax the fascia lata, and Poupart's ligament, to which it is attached. The leg should also be flexed on the thigh. Having attended to these preliminary steps, seize the whole tumor in the palm of the left hand, and draw it down. You will often find that this will considerably reduce the size of the tumor, by giving more space for the gas to pass, and enable you to return the gut. By a kind of kneeding of the intestine, it may now be returned into the cavity, in a good number of cases.

Another method which has been recommended is, to apply a gradually increasing and continued pressure over the surface of the tumor. This may be successful in some cases, but is not generally so. Either the hand of the surgeon, or a compress and bandage may be used. By means of a pocket-handkerchief, for example, we may tie up an inguinal hernia, and keep up, for a half-hour or so, an equable pressure on it. But even should these plans fail, there are yet other expedients which may be resorted to, in aid of the taxis. We may place the patient in a warm bath, bleed him from a large orifice, in order to induce a general relaxation of the system approaching to syncope, and again try the taxis. If this fails, we may still resort to other measures, if the case is not a very urgent one. *Chloroform* has been recommended; not only for its relaxing effect, but also to stop all voluntary muscular action. I presume it may be advantageously employed. It is, perhaps, the best of the relaxing agents; and should the difficulty demand the knife, it becomes a great aid to the operator, as well as an incalculable relief to the patient. As we have seen, the bowels are always costive; and, as the peristaltic action of the intestines may aid materially in the reduction of the hernia, if the symptoms are not urgent, we may resort to the use of enemata and cathartics to move them. I would advise, if it be determined to give a cathartic, that you should use castor oil and turpentine, in preference to calomel and jalap, which have been recommended by some. Of all the internal remedies, none are to be compared to the oil of turpentine. It is of course more apt to succeed, if there is only a state of incarceration of the intestine. I have again and again seen it attended with success, when all other means had failed. By its use, the resort to the operation may frequently be avoided. It should be given in the largest dose allowable. I have used half an ounce at a time; and have often found the patient to be relieved in the course of from one to two hours. Warm fomentations to the tumor, will be found useful adjuvants to your other remedies; as will also the use of evaporating lotions, or ice. In the winter, where it is attainable, a little snow and ether often proves a ready and useful refrigerant application.

But while I am advising these measures, I would at the same time caution you against a too long postponement of the operation. Time is here of the greatest importance. The operation becomes a dangerous one, only from its having been delayed so long, that the congestion of the tumor has gone on to an unhealthy inflammation, or to gangrene. I cannot consider it a formidable one to perform. It merely consists in cautiously opening the hernial sac, in dividing a few aponeurotic bands, and in returning the intestine. To do this, of course, you must know the anatomical relations of the parts, and keep them in mind while operating.

ESSAY No. 8.

OPERATIONS FOR STRANGULATED HERNIA.

Operation in general—Preliminary considerations—Operative Proceedings—After Treatment—Special Operations for Inguinal Hernia—For Crural, or Femoral Hernia—For Umbilical Hernia, &c.

As the operative proceedings for the various forms of hernia present many considerations common to all or most of the varieties, we shall first describe the principles of the operation in general, and then consider their special application.

The operation in general requires attention, in the first place, to the *preliminary considerations;* then, to the *operative proceedings;* and, lastly, to the *after treatment.*

The *preliminary considerations* are of great importance; but having determined to operate, no unnecessary delay should occur. The exigences which induce this determination have been mentioned in the preceding lecture. The instruments and apparatus to be provided, will consist of—a flat grooved director, a scalpel, a sharp-pointed bistoury, a hernia knife, a pair of dissecting forceps, a tenaculum, some needles, ligatures, and sponges, some adhesive strips, a piece of linen spread with simple cerate, a compress, and a bandage. The bladder should be emptied, the parts shaved, and the patient placed on a table or bed, near the end, for the convenience of the operator, and in such a position as to relax the parts. The most convenient position for the surgeon is between the legs of the patient; whose feet should be supported on a chair, while his knees are held by the assistants.

The *operative proceedings* are commenced by an incision of sufficient length, through the skin, and in the axis of the tumor. This is effected in the safest way, by pinching up a fold of skin transversely to the line of incision—being careful not to pinch up *any thing but the skin*—and by transfixing the base of this ridge of integument with a scalpel or bistoury, the cutting edge of which is to be turned up, so as to divide the whole fold. The incision being thus commenced, may be extended at either end, with the assistance of a director, to such a length as will afford ample room for further proceedings. The operation is then to be continued, by carefully dissecting down to the peritoneal sac. The relative anatomy of the parts must be remembered, while the various layers of fascia are being divided on a director; and any vessel, whose bleeding will obstruct the view, is to be tied or twisted at once. Concerning the next step in the operation, there is considerable difference of opinion. Some contend that the sac should always be opened, and others that it should be opened only when the stricture cannot be relieved without doing so. We will first describe the usual operation, or that in which the sac is opened, and then allude to the other method of proceeding.

Sometimes it will be found, by the sudden jet of fluid, that the sac has been opened unwittingly. In such cases, there is some risk of the accident being unperceived; when the dissection may be continued, in careless or inexperienced hands, even to the opening of the bowel, in mistake for the sac. Such a disastrous result cannot be too carefully guarded against. Each layer, as it presents itself should be examined, and then divided with great caution. When the peritoneal sac is reached, it may be known by its glossy, smooth, bulging, and rounded appearance, its membraneous character, and the "arborescent arrangement of vessels upon its surface." Sometimes it is in close connection with its contents; but generally it contains a little fluid—especially towards the lower portion—which separates it from the intestines and omentum. In most cases of long standing, it will be found more or less thickened, or otherwise changed from its original character.

If the tumor is not a large one, the sac should be first opened into at its lower portion, where there is most apt to be some fluid collection which will protect the contents from injury. In all cases, the opening should be made with the utmost caution. A small portion of the membrane is to be carefully raised up with a tenaculum, or a pair of forceps; and an opening is first to be made in this part, by cutting the raised portion transversely, with a scalpel or bistoury. Into the orifice thus made, a director is to be introduced; upon which the sac is then to be slit up. Sometimes the sac is so transparent, that the operator may be able to see some portion of the omentum, or some collection of adipose tissue, through its walls; in which case, he may choose such a spot to open over.

The next step is the division of the stricture. This is effected in the safest manner, by carefully introducing the index finger, as a director, over the intestines, and up to the stricture, with its palmar surface up and its back against the folds of intestine, to to keep them out of the way; which object may be also secured, by spreading the other fingers and the back of the hand over the protruded mass, and slightly bearing it backwards and downwards. The finger is preferable to the steel director; not only because it can perceive the presence of any fold of intestine, which may slip up and fold over the path of the knife, but also because the cutting portion of the instrument can be more accurately applied to the strictured point. The nail being insinuated under the stricture, the hernia knife, or a probe-pointed bistoury wrapped to within a few lines of the point, is now passed flat-ways along the finger, introduced under the stricture, and then turned up, so that the cutting edge may catch the strictured point; which is then divided for about a quarter or a third of an inch, by simply depressing the handle. The direction in which this incision should be made, its extent, &c., will be considered when we come to speak of the particular operations for the different varieties of hernia.

The stricture being thus relieved, the next thing to be done is to examine the parts protruded, and to effect their return, provided they are in a fit condition for the resumption of their functions. If any bands of lymph, or loops of omentum or mesentery, or plastic adhesions, are found to bind the gut, they must be disentangled or divided; and the intestine must be returned freed from all obstructions of the kind. The parts, however, must not be handled roughly or unnecessarily. In effecting the reduction, the intestine should be first introduced. The hands should be clean, the nails carefully pared and rounded, so as not to wound the delicate structures, and the fingers should be wetted or oiled. The parts should be slightly drawn down, so as to allow the portions of intestine and mesentery nearest the orifice to pass in without folding; and if the bowels are much distended with gas or fluid, gentle efforts may be made to lessen their tension by assisting its passage along the intestine and through the orifice, back into the general canal; while it should also be seen that as the intestine is replaced, its contents are not allowed to bag back, and thus to interfere with the return of the last portion. In such a result, when the large intestine is the part involved, it is advised by some "to puncture the intestine by means of a fine needle, and let out the contents rather than to make rough and protracted efforts to replace it."*

After the intestine and its mesentery have been returned, the omentum, if sufficiently healthy and not in great quantity, must be replaced by the same process of careful manipulation. If simply congested, it may be returned; but if it is thickened, lumpy, and irregular, degenerated in structure through the long continued absence from its natural position, or inflamed and gangrenous, its replacement, if practicable, could only be conducive of serious, or even fatal disease. "In all the cases of hypertrophied, inflamed, or gangrenous omentum, the best practice consists in cutting off the mass, as recommended by Sir A. Cooper and Lawrence. If it be left in the sac, inflammation or sloughing of it may occur, and the patient can derive no corresponding advantage to the danger he will consequently run. The excision of the mass may readily be performed by seizing and cutting it off at the external ring."† If any arteries bleed, they must be ligated; and the ends of the ligatures should be tied together, brought out of the wound, and kept there, in order to avoid the risk of their falling into the abdominal cavity, and exciting peritoneal inflammation. In these cases great care should be taken, lest, in excising the omentum, there may be some portion of intestine enveloped in its folds. These folds should be carefully opened and examined, before the knife is applied. The sac, as a general rule, should be allowed to remain; care having been previously taken, not to permit it to slip up with the intestine, which it is apt to do, unless held down while the intestine is being replaced. If it returns with the bowel, it may prove a cause of strangulation internally; either from the fact that *it* was the original cause of the constriction—which in that case remains unrelieved—or from some new entanglement in which it may afterwards engage the bowel. The wound, lastly, is to be closed by the application of a sufficient number of sutures and adhesive strips, and a pad of lint is to be laid over its whole length, and secured by the application of a compress and bandage.

---

* Skey. Operative Surgery, Am. Ed., p. 443.

† Erichsen Am. Ed., p. 728.

Such is the *ordinary operation* in which the sac is opened. That in which the *sac is not opened*, may be performed in the same way, in the earlier stages; and the only difference consists in not proceeding to the opening of the sac, but dividing the stricture outside of the same, by running the knife up on the finger placed outside of the sac, to the orifice, and dilating it by cutting outwards or upwards, as the case may be. Other methods of proceeding have been recommended; such as simply dissecting down to the orifice, and relieving the stricture by cutting cautiously through the rim of the outlet, or the somewhat more safe plan of a subcutaneous section, as proposed by M. Guerin, and successfully performed by Dr. Pancoast, though restricted by him to those cases of strangulated inguinal hernia, in which there is no reason to suppose that the intestine has become gangrenous, and in which the constriction exists at the external abdominal ring. If the operation is commenced with the intention of endeavoring to relieve the stricture by first dividing the rim of the orifice, and only proceeding to the opening of the sac *if necessary*, the first plan is to be preferred; and, since we can never say positively that the neck of the sac is not the seat of stricture, this is to be considered as generally the most prudent course. As a general rule, the operation in which the sac is opened, seems still preferred, notwithstanding the warm advocates whom the other method—originally pursued by Petit, upwards of a hundred years ago—has met with recently in the persons of Ashton Key and Luke in England, and Preiss in Germany, and the qualified approval it has received from Sir A. Cooper, Erichsen, and other reliable authorities.

The statistics of the operation, and his conclusions concerning it, are thus summed up by the last author: "Mr. Luke, who has had great experience on this subject, states that he has operated in eighty-four cases of hernia. In twenty-five of these the sac was opened; in fifty-nine the sac remained unopened. Of the twenty-five in which it was opened, eight died; while of the fifty-nine in which Petit's operation was performed, only seven died. That the ordinary operation, indeed, of opening the sac is an exceedingly fatal one, is well known to all hospital surgeons, and is fully proved by surgical statistics. Of seventy-seven operations for hernia, reported by Sir A. Cooper, thirty-six proved fatal; and of five hundred and forty-five cases recorded in the journals, and collected by Dr. Turner, two hundred and sixty are reported to have died. The result, therefore, of Mr. Luke's operation is most favorable, when contrasted with such as these.

"The operation, without opening the sac, may be practiced in all forms of hernia, but is more readily done in some varieties of the disease, than in others. It is especially applicable in cases of femoral hernia, in which the stricture is commonly outside the sac. * * * * * * * * * * Of thirty-one cases of femoral hernia operated on by Mr. Luke, the sac only required to be opened in seven. In inguinal hernia it is not so easy to perform Petit's operation; indeed, in the majority of cases, the surgeon will fail to remove the stricture in this way. This is owing to the constriction being usually seated in the neck of the sac, and is especially observable in congenital hernia. Of twenty inguinal herniæ operated on by Mr. Luke, the sac required to be opened in thirteen instances.

"For the various reasons that have been mentioned, I am decidedly of opinion that this operation should always be attempted in preference to the ordinary one of opening the sac, in those cases in which the hernia has not long been strangulated, presents no sign of the occurrence of gangrene in it, and more especially when it is femoral." The argument offered in support of the operation is, that it is less dangerous to run the risk of returning the parts in an unfit condition, or still strangulated, than to open the peritoneal sac, and expose its interior, and the delicate walls of the intestine, to the atmosphere, and to direct manipulation. It is difficult to tell how far this manipulation and exposure may be the cause of the subsequent peritonitis, which proves fatal in so many cases, or how far they may only increase an inflammatory tendency, which may have been established by the strangulated condition of the parts, but certain it is, that in some cases they do produce this result, or at least they arouse this tendency to a fatal degree of activity. Nor will it do to bring up other instances in which the peritoneum and bowels are handled with impunity; for it must be borne in mind, that the structures, in cases of strangulated hernia, *are not in a normal condition;* and therefore, the same degree of irritation, which in other instances would produce no effect, in these cases, in which the parts are highly congested, and sometimes even mashed and bruised, may serve to light up a high degree of inflammatory action. The risk of returning the bowel, still strangulated, is not so great as might at first thought, be supposed; for it has been found, that when the stricture is dependant on the sac or the omentum, rather than on the tissues outside, the replacement cannot, in most cases, be effected, till the sac has been opened, and the constriction removed. The danger of returning the bowel in a gangrenous condition can apply, as a general rule, to those cases only in which the strangulation has been of some duration; when it undoubtedly will be most prudent to open the sac. In all cases, it will be best to ascertain that none of the evidences of gangrene exist, before the hernia is replaced; such as the change in the constitutional symptoms, the cessation of pain, the tendency to collapse, the chilliness, &c., as also the appearance, feeling and odor of the exposed tumor. In such cases, of course, the sac must be opened, and the parts examined. In *large* and *old* herniæ, Sir A. Cooper recommended that the sac should not be opened, and that no great exertion should be made at reduction, on account of the large extent of intestine to be handled, the difficulty attending its introduction into a cavity long unused to its presence, the great likelihood of the existence of extensive adhesions, and the length of time and amount of manipulation it would require to dissect these away and return the bowel.

The *after treatment* will depend, in a great degree, upon the symptoms which present themselves. The patient must be placed in an easy, relaxed position in bed, and kept as quiet as possible; and the bowels should be allowed to rest. Their early action is a *favorable sign*, but their *forced* action is not on that account to be at all desired. Nothing can be gained by the administration of cathartics, while a great deal of irritation may be produced by their action. If there have been no fecal discharges in the course of the first day, a simple enema may be administered; and this will be sufficient. As soon as the patient is fixed comfortably in bed, he should have a full dose of opium or morphine, unless there are some indications which clearly forbid such a course. The diet should be mucilaginous and mild. For the first three or four days, nothing but gruel, barley or rice water, and afterwards beef-tea, should be allowed.

Such are the general directions to be observed. But there are certain accidents and complications, the management of which require special attention; and the most frequent of these is *perito-*

nitis. This is sometimes of such an adynamic or passive character, as to be overlooked, or mistaken for some other condition. The *acute* form presents the usual symptoms of ordinary peritonitis, and must be managed here, as elsewhere, by a strictly antiphlogistic course of treatment. It occurs in strong, healthy subjects, and is characterized by great anxiety of countenance, violent, lancinating pain, which is greatly increased on pressure, a hard, quick and frequent pulse, a dry tongue, and a hot skin. The breathing is short, being entirely performed by the thoracic muscles, and the patient keeps his knees drawn up, to prevent the pressure of the muscles upon the abdominal walls. Blood-letting must be resorted to, both general and local; and calomel, in combination with opium, must be administered at regular intervals, till the inflammatory symptoms have subsided. The mercurial must not be used in such doses as to act on the bowels. Its constitutional effect is here desired. Purgatives are inadmissible, although constipation is the usual condition present. "The tympanitis may best be removed by turpentine enemata, and any lurking tenderness by the application of blisters."*

The *adynamic* form of this species of peritonitis, is characterized by low, typhoid symptoms, and generally occurs in those of a weakened constitution. Usually there are some evidences of local inflammation, some pain or tenderness; but sometimes these symptoms are entirely wanting in cases in which, after death, the evidences of inflammatory action are very apparent. The pulse is quick, small and frequent, and the general depression is quite marked from the first. The countenance expresses great anxiety, the abdomen becomes swollen, and the vital powers rapidly give way. The treatment of such cases is to be entirely regulated by the character of the symptoms. The "tendency to death" must be obviated, by sustaining the strength with nourishing and stimulating drinks, by the use of opium, the application of blisters to the abdomen, &c., &c.

Mortification will sometimes present itself. It will either be found to exist when the operation is performed, or it takes place after the hernia has been reduced. In the former case, the part should not be returned, unless but a small portion of the gut is involved; and then the diseased portion should be left near the orifice, in order that, when it sloughs off, the contents of the intestinal canal may not be emptied into the general abdominal cavity. This course had better be pursued in all doubtful cases; that is, whenever the parts are so deeply congested, or have been so severely constricted, as to render the possibility of their recovery a matter of uncertainty. When the intestine has lost its glossy appearance and its firm, elastic feel; when it has assumed a greenish, dirty hue, and has become soft and easily torn; and especially when it gives out a putrid odor, it may be known to be irrecoverably gangrenous, and no attempt should be made at its reduction. Some surgeons doubt that it is advisable even to relieve the stricture, in such cases; but most authorities agree that it should be divided; and that the tumor should be freely opened, if it has not opened of itself, in order that the formation of an artificial anus may be facilitated.

---

* Erichsen.

When the mortification occurs after the operation, the fact will sometimes be discovered by the detection of fecal matter on the dressings, and the subsequent formation of an artificial anus. In other cases, the patient dies from prostration, and the condition is inferred from the general symptoms preceding this result, or more certainly from the post-mortem appearances.

The results of this condition depend in a great measure upon the extent of the gangrene, and the situation of the dead portion. If only a small portion of the intestine is destroyed, and this portion has been returned, but remains in a position which permits the contraction of such adhesions as will serve to prevent the extravasation of the feces into the peritoneal cavity, the patient may recover; and in some cases, without even an intestinal fistula. The part may slough into the intestinal canal, and pass off through the natural passage, while the integrity of this canal is preserved, by the adhesion which has taken place against the internal abdominal parieties.

The next most desirable result is, the adhesion to the orifice, and the formation of an artificial anus. This result will depend upon the extent of the injury, and the constitutional powers, as well as on the favorable position of the part, before the rupture of the bowel took place. Great care must be taken, therefore, when returning a portion of intestine whose recoverability is doubtful, not to push it away from the orifice; and in relieving the stricture in a case where the protruded bowel is already in a gangrenous condition, the operator should be careful not to disturb the adhesions around the orifice more than he can possibly avoid.

A *wound of the intestine*, will sometimes complicate the case. The accident is most apt to occur either in the process of the dissection at its latter stages, or when the stricture is being divided; though in careless hands, it may occur even at the first incision. Sometimes the intestine at the neck is grasped so tightly by the constricting orifice, that the finger nail cannot get sufficiently far within it to guide the knife. In such cases, it becomes necessary to use a narrow director, which cannot be managed as safely as the finger; so that the intestine in some instances will curl over into the groove, and be cut by the knife. The existence of the wound is soon detected by the character of the discharge, which wells up from the bottom of the wound. The part must be immediately examined, the bowel being prevented from slipping up till the wound is closed. If this is small, it may be caught up by its edges with the forceps and surrounded with a fine ligature, which should be drawn pretty tightly, a practice advised by Sir Astley Cooper, and adopted now by the best authorities. If the wound is too large to be readily managed in this way, it must be closed by any of the ordinary methods for treating wounds of the intestine.

An *intestinal fistula, or artificial anus*, may sometimes, as already mentioned, be the result of hernia. It is always a source of greater or less constitutional irritation; but when it involves a portion of the small intestine so high up the canal that a considerable waste of alimentary material is the result, a fatal termination is to be apprehended, unless a closure is effected. In such cases, strong nourishing diet should be allowed, and a surgical cure should be attempted. If the opening is a small one, without any very material obstruction of the canal, the condition is designated as *fistula*. If most or all of the contents of the bowel pass out, and there is a more or less complete occlusion of the natural passage, we have an *artificial anus* to deal with. In the former case we may effect a cure, by stopping up the passage by which the contents of the gut are allowed to escape. This may be done by simply applying a pad of linen to the orifice, and securing it there by means of a bandage, which should be made to exert some pressure on the part. In dealing with an *artificial anus*, however, the closure of the wound is not the only, or even the first, indication to be fulfilled. The natural passage must first be freely opened, by the removal of the "eperon," or the projecting angular fold of intestine, which blocks up this passage. This eperon or *spur* consists of the back wall of the intestine folded on itself, and so projecting forwards into the canal; and it is to be removed, either with the enterotome of Dupuytren, or by the simpler method adopted by Dr. Physick. Dupuytren's instrument is a kind of *squeezing* or *pinching* apparatus, like a pair of scissors whose blades are bluntly serrated. The eperon is grasped between the blades, and a graduated pressure is applied, by means of a screw which runs through the handles. The instrument is applied pretty tightly at first, and the pressure is gradually increased on each succeeding day, till the part has sloughed off. The process should be a gradual one, in order that the fold of intestine may not be removed before such adhesions have taken place as will suffice to cement the divided wall of the intestine behind, and prevent an escape of material into the peritoneal cavity. Dr. Physick's plan is simply to pass a ligature through the projecting fold, and to leave it tied loosely for a few days in order to excite a sufficient amount of plastic effusion to unite the parts, when the spur is to be removed with a bistoury.

There are other accidents which may occur, during the operation, or afterwards, and which the surgeon must be prepared to meet with; such as the wound of a blood-vessel, a sudden tendency to collapse from the shock of the operation, and the inflammation and sloughing of the sac after the operation. The last rarely occurs. It generally proves fatal, and may possibly be mistaken for a reproduction of the hernia, from the increased swelling and pain in the part. Such accidents, or any others which may occur, must be managed in accordance with the general principles of surgical science, as referable to each case.

We pass now to a description of the surgical anatomy of, and the particular operations for, the different varieties of hernia; and we will commence with

Inguinal Hernia.

The *inguinal canal* is the name applied to the course by which the testicle has descended from the abdomen to the scrotum. It is occupied, and kept in a measure opened, by the spermatic vessels in the male, and by the round ligament in the female. It terminates, at each end, in the *internal* and the *external abdominal rings;* so called, not from their relations to the median line of the surface of the body, but in reference to the abdominal cavity. The *internal abdominal ring* is about an inch and a half farther from the median line than the *external abdominal ring*, this being the usual length of the *inguinal canal*, while the external abdominal ring opens quite near to the os pubis. This *ring* is formed by a slit in the aponeurosis of the external oblique muscle, just where it is reflected from Poupart's ligament to the symphysis pubis; thus making a triangular opening, whose base is against the bone, and whose sides, or *columns*, are formed by the divided tendon. The internal ring is formed in the *fascia transversalis*, a layer of fibrous tissue, which commences at the back part of the Poupart's ligament, and runs upwards, just outside of the peritoneum, and in such close proximity to it, that it was called by Langenbeck, the *external layer of the peritoneum*.

The *inguinal canal* is bounded in front and below by Poupart's ligament, and a few of the divided fibres of the *internal oblique* muscle; behind and above, by the *fascia transversalis*, the conjoined tendons of the *internal oblique* and *transversalis* muscles, and the fibres of the *internal oblique* muscle. Through the space thus bounded, the *spermatic cord* passes in the male, and the *round ligament* in the female. The spermatic cord is invested, first, by the *tunica vaginalis communis*, a kind of serous membrane, originally protruded from the abdomen by the descending testicle; then, by a process of the *transverse fascia*, which in old hernia cases is apt to become dense and laminated, and is then called by some the *fascia propria* of the hernial tumor; next, by the *cremaster muscle*, which is nothing more than a few bundles of lengthened muscular fibres from the *internal oblique*; then, as it passes through the outer ring, it receives an additional covering from the fibrous and cellular tissues there, the *intercolumnar fascia*; and lastly, after leaving the ring, it is covered with the superficial fascia of the part, which becomes the *tunica dartos* of some authors, and the skin. By bearing these relations in mind, it becomes easy to account for the presence of the various layers, of greater or less density, which are generally found to invest an inguinal hernia; though these different structures cannot always be identified in that unnatural condition of the parts, which is generally brought about by the affection.

Just a little to the inner side of the internal ring, passes the *epigastric artery*. It arises from the *external iliac*, quite near Poupart's ligament, and runs inwards and upwards between the *fascia transversalis* and the *peritoneum*, crossing behind the spermatic cord, or the round ligament, as the case may be, *just at the inner* *side of the internal abdominal ring.* It forms a prominent ridge on the internal surface of the peritoneum, as it courses diagonally across this region to the *rectus* muscle.

When we speak of the inguinal *canal*, and the external and internal *rings*, it must not be supposed, that in a natural condition of the parts, such open passages do actually exist. In good health, they are blocked up with the tissues of the part, and exist only as so many *weaker points*, where a passage may be more easily effected than at other parts of the abdominal parieties. The cul-de-sac, or pouch of peritoneum which the testicle carries down to the scrotum with it, soon becomes cut off at its neck, except in those cases in which the parts are affected with a *congenital* hernia, and where a hernia accompanies the descent of a testicle, which had been retained in the abdomen. Where this pouch has been divided from the peritoneum, there is often found a *pucker*, or kind of navel-like depression on the surface of the membrane, just over a weak spot in the transverse fascia; and this becomes in hernia, the *internal ring*. The *external ring*, in health, is closed up by the *intercolumnar* fascia, and also, from behind, by the conjoined tendons of the internal oblique and transversalis; and it is only opened when the bowel has escaped through the internal ring, or through the *inguinal pit* or "*fossa inguinalis* of Hesselback," a weak spot in the abdominal parieties, just opposite the external ring *and to the inner side of the epigastric artery.*

Having thus examined the surgical anatomy of the parts, we are prepared to consider the different forms of rupture, to which the inguinal region is liable.

Inguinal hernia is to be divided, in reference to the points of escape, into two forms; *oblique* or *external*, and *direct* or *internal inguinal hernia.*

Oblique or external inguinal hernia follows the same course as the testicle in its descent, and therefore receives pretty much the same investments. It may be *incomplete*, or just in the canal; it may be *complete*, or *scrotal;* it may be *congenital*, in which case it is within the tunica vaginalis; or it may be "*encysted,*" or "*infantile.*" The *relations* of oblique inguinal hernia, as already stated, are pretty much the same as those of the spermatic cord or round ligament, these structures themselves, and the testicle, in cases of scrotal hernia, usually lying immediately behind the tumor. "In some cases the elements of the spermatic cord become separated, the vas deferens lying on one side, and the spermatic vessels on the other. In other rare cases again, an instance of which there is a preparation in the University College Museum, the hernia lies behind the cord, and has the testis in front. In other cases again, it may happen, as was observed during an operation, in which I assisted my friend, the late Mr. Morton, that the elements of the cord are all separately spread out on the forepart of the hernial tumor."*

Direct or *internal inguinal hernia* occupies but a portion of the inguinal canal, not escaping by the internal ring, but forcing its way through a weak portion of the abdominal wall, opposite the external ring. This weak spot is marked, internally, by a slight triangular depression to the inner side of the epigastric artery, and is called the *inguinal pit*. The peritoneum at this point is supported only by the transverse fascia, and a few fibres of the internal oblique muscle, with a portion of the conjoined tendon of this and the transverse muscle. The hernia pushes forwards or ruptures the back wall of the canal, enters directly the external inguinal ring, and afterwards pursues the same course as the oblique or external form. According to Erichsen, there are two varieties of direct inguinal hernia; one passing out *above* the remains of the umbilical artery, and the other *below*, the latter being the most frequent.

In inguinal hernia, the relations of the epigastric artery must always be remembered. In the oblique form, this vessel lies to the *inner* side and *behind* the neck of the tumor; while in *direct* hernia, it lies on the *outer* side of the neck. In old and large herniæ it is often deflected from its oblique course across to the rectus muscle, and made to dip downwards, in a half circle, by the weight of the large tumor. In such cases too, the distinctive features of the two main varieties of inguinal hernia are often totally obliterated, so far as the external appearance is concerned. From the constant traction exerted by the tumor, the two rings are approximated, and the canal, in many casas, becomes entirely obliterated.

The ilium is the part of the intestinal canal, which is most frequently involved in inguinal hernia; and next to it the cœcal extremity of the large intestine, with its vermicular process. When any portion of the colon is contained in the hernial tumor, the whole of the gut is not covered with peritoneum. In operating for the strangulation, there is, therefore, greater risk of the surgeon's wounding the intestines, than in other cases; and the same remark will obtain, also, in reference to the bladder, when it is involved. Sometimes the uncovered side gets twisted round to the front of the tumor, and so causes the hernia to appear to the operator as if it had no sac, or induces him thoughtlessly to cut into the organ itself, in mistake for the peritoneum.

---

*Erichsen, p. 732.

Congenital inguinal hernia, as already mentioned, lies in the tunica vaginalis communis. Its relations, therefore, are somewhat different from those of ordinary oblique inguinal hernia. Descending directly in the yet unclosed canal, and dilating this passage, it lies in actual contact with the cord and testicle, and has no peritoneal sac proper to itself. Though this form of inguinal hernia is called congenital, in many cases it does not present itself till some time after birth. In such cases, it is to be presumed that the inguinal canal has become but partially closed, after the descent of the testicle; or, in other words, that the peritoneal prolongation has not become sufficiently condensed around the cord.

Encysted or infantile inguinal hernia is merely a variety of the congenital hernia. The canal being obstructed at a certain point, the hernia descends to that point, and then causes the wall of the passage to bulge downward into a kind of pouch, which is ultimately changed into a partial *cyst*, as the tumor passes down. In such cases, therefore, to use the words of Sir Astley Cooper, "on opening the tunica vaginalis, instead of the intestine being found lying in contact with the testicle, a second bag or sac is seen enclosed in the tunica vaginalis, and enveloping the intestine. This bag is attached to the orifice of the tunica vaginalis, and descends from thence into its cavity; it generally contracts a few adhesions to the tunica vaginalis, while its interior bears the character of a common hernial sac.

The *operation for strangulated inguinal hernia*, does not differ in many respects from that already described for hernia in general. The incision should be of different lengths, in accordance with the size of the tumor. In old cases where the hernia is a large one, it will sometimes be neccessary to extend it to the length of *three* or even *four inches*. The parts are to be shaved; the patient brought to the edge of the bed, and his legs opened for the operator to get between them; the bladder is to be emptied, and then the incision is to be made in the median line of the tumor, extending from just above the external abdominal ring, as far down as the size of the hernia may suggest. In making this incision, it must be borne in mind that the hernia may have no sac, and therefore great care must be taken lest the intestine be opened. Sometimes such an amount of blood follows this incision, that it becomes necessary to stop and secure the arteries from which it flows. No attempt should be made to continue the operation, till the wound is sufficiently free from blood to admit of the parts being seen. The dissection is then to be carefully continued, and not unfrequently the superficial fascia, which is next reached, is found stronger and thicker than in a normal condition, this being more apt to be the case with those who have been in the habit of wearing a truss. After dividing this fascia on the director, the band of intercolumnar fascia is arrived at, and in some cases it will be found that the constriction is caused here, in part if not entirely. This layer is sometimes thickened, and occasionally it lies in close connection with the superficial fascia. After dividing it in the same manner as the others, if the hernia is of the *oblique* variety, the cremaster muscle, so called, will be seen spreading over the tumor, and the cord will generally be invisible, as it lies behind the hernia, while if it is a case of *direct* hernia, the cord, and generally its cremaster muscle, will be seen in most cases, on the outer side of the neck of the hernia. Next we come to the transverse fascia, which is to be carefully slipped up on a director through the whole length of the wound. The neck of the tumor is then to be examined; and if the stricture appears to be situated outside of the sac, either in whole or in part, there is no occasion to expose the intestines until the outside section has been tried, and has failed to relieve the strangulation. The incision for this purpose must be made, as a general rule, directly upwards; but if the precise nature of the hernia can be distinctly made out, it may be inclined from the direction of the epigastric artery, which, it must be remembered, lies on the *inner side* of *oblique hernia,* and on the *outer side* of *direct hernia.* In most cases of long standing it will be difficult to make out the distinction. Should the division of these structures fail to relieve the bowel, the sac must then be carefully opened, and the operation concluded in accordance with the directions already laid down. Great caution must be observed at the latter stages of the operation. In some cases no sac is found, and the operator comes directly upon some portion of the large intestine, or the bladder, which thus runs the risk of being mistaken for the peritoneal pouch.

The *incomplete inguinal hernia* does not, of course, require such an extensive incision for its relief. In other respects, the proceedings are the same as when the hernia is complete. It is almost always of the oblique variety, and therefore the knife may generally be turned outward in dividing the stricture, though, as there are some instances of *incomplete direct hernia,* this plan should be adopted only in those cases, of whose nature there can be no doubt.

Congenital inguinal hernia, or more correctly *hernia in the tunica vaginalis,* when it becomes strangulated, is seldom relieved except by the operation; and as the stricture is almost always found to be in the neck of the sac, this must pretty generally, if not always, be opened. The stricture may always be divided in an outward direction, as the hernia is of course of the oblique variety. If the operator is at all doubtful of the correctness of his diagnosis, however, he should cut directly upwards, so that, in either case, he may avoid the artery.

Encysted inguinal hernia, it must be remembered, lies within the tunica vaginalis, and also in an additional covering of its own. So that, in operating on this variety of hernia, it becomes necessary to enter the vaginal tunic, and then to open the cyst, or hernial sac proper, which is composed of a double fold of serous membrane.

Thus it may be seen, that in operating for inguinal hernia of any kind, a variety of contingencies may present themselves, the precise nature of which cannot be known beforehand.

In some cases, the cord may be found in front of the tumor: or its constituents may be separated, and lie over different portions of the hernia. This condition, however, is very seldom met with. In congenital hernia the testicle is sometimes found adherent to the intestine, the omentum or the mesentery; and if such adhesion is not too close or extensive, it becomes necessary carefully to dissect the parts asunder.

Sometimes the cœcum, colon, or bladder is found to be the protruding organ; and frequently, in these cases, such adhesions have formed, as to prevent the replacement of the viscus; when all we can do is to relieve the structure, and close the wound. The parts, in some such instances, become gradually replaced of themselves; and this tendency may perhaps be somewhat aided, by judiciously applied pressure.

After the relief of the strangulation has been effected, and, if practical, the parts have been replaced—the intestine first, then the mesentery, and lastly the omentum, if it is in a fit condition, and there is not too much of it—the wound should be cleansed, and its lips brought together by means of the interrupted suture; a compress and bandage should be applied; an opiate should be administered; and the after treatment should be conducted in accordance with the directions already given. The kind of compress and bandage recommended by Skey, would seem to be the most appropriate in these cases. He says, "A pad of lint should be placed over the ring, and over the pad a large handful of cotton wool, or in its absence a folded towel or masses of lint, so applied as to compress the ring from below, without involving the walls of the abdomen. Over these, a bandage should be dexterously applied, like the figure of 8, passing round the abdomen and the thigh of the affected side, fixed by a needle and thread, or by pins at every turn, as it passes over the compress, and from that point carried back. By this means the compress will form the centre of pressure."*

Femoral Hernia.

The intestine, in femoral hernia, escapes through the *femoral ring*, or the orifice through which the femoral vessels pass from the abdominal cavity. The space beneath Poupart's ligament and between it and the ileo-pectineal ridge, is securely blocked up with muscles, cellular tissue, layers of fascia, &c., except at its *inner and lower point*, where these vessels pass; and here the femoral ring is located.

Poupart's ligament, at its pubic extremity, spreads out so as to be inserted not only into the symphysis pubis, but also into the spine and body of that bone. The outer and lower edge of the ligament, as it turns downward to effect this latter insertion, is called *Gimbernat's ligament*, and forms the inner border of the *internal femoral ring;* whose upper border is formed by Poupart's ligament; whose lower, by the os-pubis; and whose outer, by a portion of the *fascia transversalis*, which extends downwards from Poupart's ligament, and separates the artery from the iliac muscles.

The external iliac vessels come down between the *iliac fascia* (which is only the iliac prolongation of the *fascia transversalis* of inguinal hernia,) and the peritoneum, and pass through the ring, the artery being on the outer side. As they pass through, the fascia transversalis from Poupart's ligament, and the iliac fascia from behind, fold downwards with them, and form the common *sheath of the vessels*, or *the "infundibilar fascia"* of some. This sheath continues downwards with the vessels, and, becoming perforated by smaller veins and lymphatics, is converted into the "*cribriform fascia*." Internally it is divided by a septum, which passes between the vein and the artery.

---

* Skey's Operative Surgery, Am. Ed., p. 454.

The portion of the femoral ring which presents the least opposition to the descent of the intestines, lies immediately on the inner side of the vein, between it and the curved border of Gimbernat's ligament. In health, this space is occupied by cellular tissue, and sometimes by one of the glands of the part. The hernia almost invariably escapes at this point. The peritoneum is protruded into the sheath of the vein, and the tumor lies on the *inner side of this vessel.* Descending in the femoral canal, it becomes covered also with the *fascia lata* of the thigh; and, escaping from under the "*falciform process*" of the fascia lata, or the fold of this membrane which passes from the *sartorius* muscle to the *pectineus*, it lastly receives an investment from the *superficial fascia*, and the *skin*.

From the greater laxity of the parts at the upper portion of the thigh, the tumor does not descend the limb; but, as soon as it escapes from beneath the falciform process of the fascia lata, or, as it is expressed by others, as soon as it passes through the *outer ring* of the *femoral canal*, it curls upwards, and sometimes even folds over, and rises above Poupart's ligament. In such cases it may be mistaken for inguinal hernia, unless care be taken to see that the neck of the tumor lies *beneath* the ligament. This *femoral canal*, is merely the space in which the femoral vessels lie, till they pass through the oval opening in the fascia lata formed by its falciform process. It is about an inch and a half in length, and passes along the surface of the *pectineus* muscle, enclosed between two layers of the fascia lata.

The relations of the hernia to the vein, to the *epigastric*, and *obturator* arteries, and to the cord, must be fully appreciated, in order to operate with safety. The *vein* is directly on the *outer side*, and will not be in danger, except in very ignorant or careless hands. The *epigastric artery*, arising from the femoral artery quite near Poupart's ligament, and inclining inwards as it courses up, lies on the *outer side*, and *above* the *neck* of the hernia; nor is there much risk of its being wounded.

The *obturator artery* is the one most frequently injured, from the fact that its origin is quite uncertain. Its normal origin is generally considered as that from the *internal iliac;* but there are so many exceptions to this rule, that one writer (Chelius,) affirms that its origin is "almost more common from the epigastric." It may also arise from the *external iliac*, or the *femoral*. When springing from the *internal iliac*, it is out of the way; when from the *epigastric*, it generally arises from this vessel quite near its own origin; in which case it passes down between the vein and the hernia, and therefore to the *outer side* of the latter; and, as the stricture is to be divided inwards or upwards, there is no risk of wounding it. But sometimes it does not spring from the epigastric, till this vessel has passed some little distance on its upward and inward course; in which case it may pass down on the *inner* side of the neck of the hernia, and is very much exposed to injury during the operation. If it arises from the *external iliac* or *femoral*, it pretty generally passes on the outer side, and is out of the way of injury. It is fortunate, that either the internal position is a rare one, or that, as observed by Erichsen, "when it does occur, as it [the obturator artery] passes directly over that portion of the crural ring through which the sac would protrude, it necessarily strengthens this, and so diminishes the chance of rupture." This would seem, according to the researches of Cloquet, to be quite a common origin and course for the vessel to take. In two hundred and fifty subjects examined by him, one-half of whom were females, the arrangement was found to obtain in one-third of the cases.*

There is another—but an exceedingly rare—form of femoral rupture, which is situated on the *outside* of the vessels, and which is therefore called *external femoral hernia*. It lies between the *femoral artery* and the *anterior superior spinous process of the ilium*, and, in its first stages, it is covered by the iliac fascia After a while, this fascia may be ruptured; and it is only when this occurrence has taken place, that there is any appreciable risk of strangulation. When the fascia is entire, the base of the tumor is the widest part; but should this layer of fascia be ruptured, and the bowel escape from beneath it, the strangulation may occur at the orifice in the fascia.

The tumor "is gradually developed, forms at the place mentioned a moderately raised swelling, which, becoming narrower below, ascends, however, obliquely inwards, and terminates with a blunt point in the region of the lesser trochanter. The finger cannot in the least be brought under either of its edges. If in its further growth the rupture overcome the anterior iliac *fascia*, the form and direction of the swelling is changed; a new one is developed beneath the old swelling, which always extends further between the *fascia lata* and the muscles of the thigh."* The *circumflex ilii* artery passes over the mouth of the hernia, and may be wounded should an operation be necessary.

---

* Smith's Operative Surgery, p. 438.

Unlike inguinal hernia, femoral ruptures occur much more frequently in *women* than in *men*. They very seldom appear in childhood; and the few cases which do occur at this stage of life, very seldom become strangulated.

The intestines in strangulated femoral hernia are more severely constricted than in any other form of rupture; and the operation, therefore, cannot be postponed as long as in other cases. As soon as the other measures for its reduction have failed, the operation should be immediately resorted to. The stricture, according to most authorities, is almost invariably situated outside of the neck of the sac. One German writer (Jaeger) even asserts—according to Chelius—"that no case of strangulation by the neck of the sac is known." The latter authority, however, very correctly denies the assertion; while South affirms that the stricture is, "almost invariably," in the neck of the sac.

According to Sir A. Cooper, Erichsen and others, it is generally situated in the fascia that forms the sheath of the vessels, *i. e.* the *fascia propria* of the hernia. In many instances, it is situated in Poupart's, Gimbernat's, or Hey's ligament; or, as mentioned by Acton Key, in the tendinous bands joining "the fascia transversalis to the posterior margin of Poupart's ligament;"† and sometimes the *falciform process* is the seat of the constriction.

The *operation* for the usual, or the internal, form of femoral hernia, should vary somewhat, according to the size of the tumor, and the intention of the operator in reference to the sac. When the tumor is small, and the patient is not very corpulent, a single straight incision will be sufficient; and this is ordinarily made directly over the tumor. But if it is not intended to open the sac, the plan, suggested by Gay and recommended by Erichsen, of making the incision on the inner margin of the neck of the hernia, may be adopted. By cautiously deepening this incision, layer by layer, the *falciform process* of the *fascia lata* is found. The finger, or a broad director, must be insinuated between the edge of this fascia and the hernia; the hernia-knife must be introduced; and the constricting vein of the fascia must be divided for about the sixth of an inch, in a direction upwards and inwards. Reduction is now to be attempted, and if there is any difficulty in effecting a return, the neck of the tumor must be examined, when some constricting bands will generally be found running across it, and binding it. These being carefully divided upon a director, or with a scalpel and pair of forceps, the bowel can usually be returned without any further trouble.

---

* Chelius' System of Surgery, Am. Ed., p. 337, vol. ii.

† Idem, p. 335, vol. ii.

But should the hernia be a large one, or the patient be quite fat, a single straight incision will not enable the operator to obtain sufficient command over the parts. Under these circumstances, several plans have been recommended. That most usually adopted is, to cross the first straight incision at its base with another, so as to make the figure of a reversed letter T, (⊥). Dupuytren advised a crucial incision; and Erichsen recommends that an incision should first be made "parallel to Poupart's ligament, by pinching up the skin, and then a transverse cut from the centre of this and carried over the tumor, so as to present the following shape: ⅄ ⋌." Mr. Lawrence prefers a single, but *oblique* cut, beginning one inch above the femoral ring, and running downwards;* and he is supported by Skey; who does not "see the necessity of a second incision at right angles, because there is no advantage gained by cutting on to the tumor, the contents of which, when exposed, may be drawn inwards in a line with the ring." A single oblique incision is advised by Chelius also, who says that it should correspond to Poupart's ligament, and extend "half an inch over the swelling towards the iliac spine and the pubic *symphysis*."

In which of these ways the operation is to be commenced must be determined, in some degree, by the particulars of each case. If the patient is quite corpulent, the single incision will not answer as well as either of the other three methods; while in those cases in which the impediment does not exist in such excess, the single oblique cut recommended by Lawrence, or that advised by Chelius, would seem to be preferable.

The other steps of the operation are to be conducted as in other forms of hernia. The superficial fascia is generally divided with the skin, as it adheres pretty closely to it. Sometimes the fatty and cellular tissue then reached, is quite thick, especially in corpulent subjects; while in other cases, it is scant and thin. It is to be carefully dissected through; and then the *fascia propria*, or distended sheath of the vessels, is reached. In old and large hernia, this is apt to be so much stretched as to be quite attenuated; while in some cases it has become very much thickened, when it may even be mistaken for a mass of omentum distending the hernial sac. This condition is most apt to obtain in those cases in which the use of the truss has been long continued; and it is to be distinguished by its even and hard surface, and by the abscence of the peritoneal vessels. After carefully dividing this structure, layer by layer,—for sometimes two or three of these layers will be found—the hernial sac will be exposed. If it is intended to open the sac, this must now be carefully effected, by lifting, with the forceps, the most dependant portion, cutting slightly against the points of the instrument, and then inserting a director, and slitting up the membrane to the length of the wound.

---

*See Smith's Operative Surgery, p. 435.

This stage of the operation must be conducted with especial care. As the fluid accumulation in the sac is generally quite small, and as there is usually but little omentum involved in the hernial tumor, there is considerable danger of wounding the intestine. The stricture is now to be sought for, and divided for but a slight distance, in a direction upwards and inwards. This is the direction now generally adopted as the safest. The reasons for preferring it, are dependant upon the surgical anatomy of the parts. On the *outer* side, lies the femoral vein and the epigastric artery, the latter being *above* as well as on the outer side; and immediately above, passes the *spermatic cord*. These relations are pretty nearly invariable: so that the *inner* side is the one most usually free from any important structure; though it must be remembered, that in some instances the *obturator artery* lies on this side of the tumor. The injury of this vessel may be avoided by using a rather dull knife, and by effecting the division of the stricture by *pressure*, rather than by a *drawing* motion. Nor need the incision of the edge of the stricture be carried but a slight distance; for if its sharp edge is simply nicked by a little pressure, the dilatation will generally be found to be sufficient to admit of the easy reduction of the hernia. "The use of a dull bistoury, and the direction of its edge upwards for merely a line, at several points of the ring, as advised by Velpeau, no matter in what portion of the circumference of the ring the stricture is most marked, will suffice for the relief of the constriction, as may be readily tested on any subject."*

The upward and inward direction of the incision for the relief of the stricture is preferred, not because the cut in this direction is safer than one made directly inwards, but because the cut into Gimbernat's ligament, which would be the part incised in the latter case, would not have so great a dilating effect upon the crural orifice, as a division to the same extent of the "ilio-femoral" ligament, which is the part involved in the upward and inward incision.† After the stricture is relieved, the parts are to be examined, and treated in reference to their condition; and the subsequent management of the case is to be conducted in accordance with the general principles already laid down.

The operation for strangulated *external* femoral hernia consists, in carefully dissecting down to the tumor, and relieving the stricture by dividing, layer by layer, the parts that seem to produce the constriction; which is the only possible way, "according to Hesselbach, to avoid wounding the circumflex iliac artery, which always lies in front of the neck of the sac."‡

Umbilical Hernia.

This form of rupture occurs through the umbilical aperture. It is sometimes congenital; and it very frequently appears in early infancy, before the changes in the umbilical cord have firmly blocked up the navel; the immediate cause, in such cases, being some violent fit of crying or straining, on the part of the infant. In adults, it is generally found on females who have been frequently pregnant, in those who are very corpulent, or after great distention of the abdomen by dropsical effusions. It is probable, that in most cases of true hernia of the navel occurring in adults, there has been a tendency to the affection from birth or childhood; for if the changes which normally occur in the structures about this orifice just after birth have progressed to a healthy termination, it is difficult to perceive how so strongly fortified a position would give way sooner than other and weaker points. In childhood, the hernia is readily cured by proper compression of the part, kept up for a few months. In some cases, a *spontaneous* cure is effected. In adults, it is apt to attain a very great development, unless the bowel is retained in the abdomen, or supported, when irreducible, by means of a proper truss.

---

*Smith's Operative Surgery, p. 438. †Erichsen. ‡Chelius.

An irreducible umbilical hernia is liable to both incarceration and strangulation; and it is sometimes difficult to say, which of these conditions obtains in a given case. Under such circumstances, the best plan to adopt, after having tried the taxis, relaxants, depletives, &c., and after finding that the bowels continue in a state of inaction,—is, to treat the case as one of strangulation, and resort without delay to the operation. When undoubted strangulation is present, the knife should be early resorted to, as it is but seldom that the other plans succeed in effecting relief.

The surgical anatomy of the parts concerned is simple. In most cases, there is no proper hernial sac, the peritoneal covering having become either adherent to the under surface of the superficial fascia, or perforated at an earlier stage of the affection. The intestine, therefore, has not as many envelopes as in femoral or inguinal hernia, it being only covered by the skin and the superficial fascia, with, perhaps, the remains of the peritoneal sac.

In *operating* for umbilical hernia, various methods are recommended. The plan advised by Erichsen would seem to be the best, as it produces the least disturbance of the bowels. He recommends "a semilular incision five or six inches in length, by the side of the tumor," which is to be deepened, by careful dissection, to the linea alba; when a careful opening is to be effected in this tissue, "and a director having been passed down towards the neck of the sac, under the stricture, the section should be made with a probe-pointed bistoury." If it is found impossible to divide the stricture by this plan, he then proceeds to lay the sac open, and to relieve the stricture from within. The incision, for this purpose, may be made without any risk, in any direction around the navel, and should be from one-half to three-quarters of an inch long. It is to be made directly upwards or downwards, or both above and below, if desirable.* The bowels are then to be examined, and if it is determined to return them, and there is any difficulty in effecting this object, it is suggested by Skey, that "the abdominal muscles may be raised by introducing the finger through the opening, and drawing them upwards, so as, in fact, to enlarge the cavity into which the intestine is to be returned."

The after treatment must be conducted with a view, if possible, to effect a permanent cure. An efficient and firm compress should be applied over the orifice, and the use of a proper truss should be resorted to, as soon as the wound can bear it.

---

*Skey, p. 460.

Sometimes a large umbilical hernia is divided into several parts, by the unequal distension of its coverings; and, occasionally, the divisions between these sacculi, or lobes, are formed of constricting cellular bands, which require division, when the operation is undertaken.

The strangulation of an umbilical rupture very seldom occurs in a pregnant woman. Should a case present itself, however, in which this condition obtains, the operation should, nevertheless, be performed, as it offers the only reasonable chance for life. Some cases of success, under these circumstances, have been recorded by reliable authority. The success of the operation for the relief of strangulated umbilical hernia would seem to be pretty fair, according to the statistical reports. Of *seven* cases collected by Smith, from Lawrence, Scarpa, and Dessault, *one* proved fatal: of *seventeen* cases of *femoral* rupture, from various causes, only one was unsuccessful; while in *forty-nine* operations for *inguinal* hernia, *fourteen* died, and one had artificial anus. From the investigations of Thomas Bryant, Esq., of 126 fatal cases, occurring in Guy's Hospital, one of the conclusions arrived at was, "that after operation, inguinal hernia was more fatal than femoral by 16.6 per cent."*

Other forms of Abdominal Hernia.

The other forms of abdominal hernia, are much less frequently met with than those already mentioned. In some, strangulation never occurs; in others, it takes place, and there is no prospect of the operation being performed with success; while in some of these forms of disease, the operation is practicable, with a greater or less degree of success. We will confine the rest of our remarks to this last class.

Thyroid or obturator hernia has been operated on successfully, but only in two cases; one by B. Cooper, and the other by Mr. Obre.† The existence of the affection is very rarely discovered during life, on account of its deep-seated location. The intestine protrudes through the foramen in the obturator membrane through which the obturator vessels pass, and is so covered up, and pressed upon, by the *pectinous adductor longus*, "the long and middle head of the *triceps* and the *gracilis*"* muscles, that it is prevented, in almost every case, from producing any perceptible prominence. Should an operation be determined upon, the same general principles must be attended to that have been already elucidated, the anatomy of the parts being thoroughly appreciated. When the point of stricture is reached, an attempt may be made to dilate the orifice by means of a blunt hook, the traction being made in an outward and downward direction. If this plan fails, the knife must be resorted to, and an incision must be made, according to Sir Astley Cooper, on the inner border.

---

*See New Orleans Med. and Sur. Journal, Vol. xiii, No. 5, p. 698.

†Erichsen.

Ischiatic, or *dorsal* hernia may *sometimes* require the performance of an operation. It is generally too small to be discovered; but, it occasionally attains considerable dimensions, contains a great quantity of intestines, and sometimes the whole bladder and even the womb. The rupture takes place through the ischiatic notch, " above the sacro-ischiatic ligaments and pyriform muscle, below the gluteal muscle, and appears externally near the lower part of one of the lateral edges of the rump-bone, or *coccyx*."† In *operating*, the utmost caution must be observed in the dissection; the vessels must be tied as they are cut; and, if the dilation with the blunt hook fails to relieve the stricture, the incision must be made directly forwards. According to Chelius, one authority (Seiler) "considers it absolutely necessary in dividing the mouth of the sac, to cut layer-wise from without inwards."

Perineal rupture, in some very rare cases, may require the performance of the operation. The usual course of proceeding is to be adopted; and the constriction will generally be easily relieved by a slight incision into the edge of the hernial sac, "from below upwards obliquely towards the side. (Scarpa.)"†

Ventral hernia, or hernia through various portions of the abdominal wall besides those particular localities already mentioned, may sometimes become strangulated, and may require a resort to the knife. The omentum may be alone implicated, or the intestines, bladder, womb, &c., may be involved. These ruptures are of various forms and sizes, and are situated in various localities. Their neck is generally oval; and, in most cases, the orifice through which they have escaped becomes so dilated as pretty nearly to obviate all risk of strangulation. Sometimes, when situated near the navel, they are mistaken for umbilical herniæ; and, vice versa, these latter are occasionally thought to be ventral. They are sometimes met with in the lumbar region; and in many cases, they are the results of traumatic injury. In these cases, if the wound has penetrated or seriously injured the peritoneum, the hernia may have no sac; and this fact should be borne in mind, when operating on a case which has so originated.

---

*Lawrence. †Chelius.

The operation is similar to that for umbilical hernia. It will generally be prudent to open the sac, if one exists; and the stricture should be divided in an upward direction, with due regard, always, to the anatomy of the particular locality in which the hernia may happen to be. S. L.

ESSAY No. 9.

DISEASES ABOUT THE ANUS.

Prolapsus Ani—Piles—Polypus Ani—Stricture of Anus and Rectum—Fistula in Ano—Recto-vesical and Recto-vaginal Fistulæ—Congenital Malformations.

A great deal of pain and discomfort is sometimes the result of a relaxation and falling of the rectum to a greater or less extent. This affection may arise from a prolapsed condition of the mucous lining membrane of the rectum; or it may consist in a descent of the entire tube. The latter, however, is of very rare occurrence, but is a much more serious affection than the first.

The *cause* of prolapsion is generally, a relaxed state of the tissues about the anus, resulting from a state of general weakness and relaxation from bad health. The disease may, however, also arise from constant irritation of the parts: as from tenesmus accompanying dysentery, or the great effort necessary on going to stool after an attack of costiveness. The affection may also arise from, or accompany, stone in the bladder, stricture, or any disease that shall render the passage of urine difficult, and hence cause effort or straining to be necessary. Piles, too, are a frequent cause of prolapsus: the latter affection, in such cases, being generally cured as soon as the former one is removed.

The *symptoms* of this complaint are too evident, for a mistake in diagnosis ever to occur. A tumor is found occupying the region of the anus—if recent, red, smooth, and polished; or darker, and inclined to be turgid and swollen, if of longer duration. This tumor is found on examination, to be continuous with the mucous membrane of the interior of the rectum. The swelling generally first appears after some violent exertion in emptying the bowels. It is at first easily returned, gives no trouble, and does not again descend for some time. Gradually the descent becomes more and more frequent, until it occurs on every attempt at going to stool, and on taking any severe exercise, as riding, walking or standing for any length of time. When the disease becomes fixed, the tumor is always down, and cannot be returned without difficulty; and when returned, it immediately comes down again.

The *treatment* of this troublesome affection must depend very much upon the length of time it has existed, and the extent to which it has gone. If recent, and only of occasional formation, the tumor should be at once returned beyond the sphincter, a compress, supported by a T bandage, applied over the anus, and astringent injections frequently used. The bowels should be kept in rather a loose state, by the use of such food as will tend to keep them free and by aperients—if necessary. The bowel having been reduced, the patient should be put to bed, and kept for some time in the horizontal position. The easiest method of reducing the bowel is, to oil the index finger well, and then cover it with a well oiled and soft rag, and proceed exactly as though the object was to examine the upper portion of the interior of the rectum. The finger should be passed as high as possible; then with the finger and thumb of the left hand pressing firmly around and against the sphincter, and causing that muscle to grasp the finger in the rectum tightly, this should be gradually and slowly withdrawn, leaving the cloth, which surrounded it, behind. When the finger is completely withdrawn, the cloth should in like manner be carefully removed. This will be found a simple and effectual method in all cases. After the tumor is reduced, astringent lotions, as above directed, should be used, and if the patient be a female, a pessary should be worn in the vagina. As an injection, solution of sulph. of iron has been recommended—of the strength of three grains to the ounce of water—and is perhaps as good as any of its class. When this—which is known as the palliative treatment—fails, recourse must be had to some operative procedure.

The *operations* for prolapsus ani have been divided into two classes, each having reference to the parts in which it may be performed. In one class—that in which the operation is external—the object is to close the anus more thoroughly, by inducing greater contraction of the sphincter. This operation is based on the fact, that in every case the tissues around the anus are in a relaxed state, and the skin loose and wrinkled; while the sphincter remains so much relaxed that the anus is but slightly closed. In the second class, the prolapsed mucous membrane itself becomes the seat of operation. The object is to prevent the return of the tumor, by causing sufficient contraction in the mucous membrane to prevent its falling. The patient should be placed so that the tumor shall be fully exposed: he should lie upon a bed on his belly, with the feet and legs hanging over the ends, so that the buttocks shall rest just over the edge. The surgeon then takes his position behind the patient, and the thighs are drawn apart by two assistants, while he seizes, with a pair of forceps armed with large teeth, in succession, two, three, or more folds of the anus, and removes them with a pair of scissors curved on the flat. These incisions extend to the verge of the anus, or beyond it, according to the amount of relaxation to be overcome. This operation is said first to have been performed by Hey, but is generally known as Dupuytren's. It is best adapted to those cases that are attended by prolapsion of both the muscular and the mucous coat of the rectum.

Several methods of operating when the affection is included in the second class, as above mentioned, have been advised; all of these, however, have as their object, the production of contraction in the rectal mucous membrane. It has been proposed to lift the most prominent part of the tumor with a pair of forceps and remove it by the bistoury, or with a pair of scissors; the rest of the tumor being then returned above the sphincter. The membrane should not return until all hemorrhage has ceased, as the bleeding is sometimes profuse. To prevent this risk of hemorrhage, Ricord is said to tie each artery as it is divided, and to divide the tumor slowly, with successive strokes of the bistoury, stopping to tie each artery, and not proceeding until the bleeding has ceased in that part of the wound. Erichsen, on the contrary, advises that the use of cutting instruments be done away with, and the ligature substituted. He advises that the "ligature be applied in the following way: the patient having had the bowels freely opened on the preceding day, and an enema of tepid water on the morning of the operation, should be directed to sit over a pan of hot water, in order to make the prolapsus descend; it may then be seized with a pair of broad-ended forceps and drawn well forwards. The base must then be firmly tied with a strong piece of whip cord, and a similar process repeated on the opposite side of the anus." Should it be difficult to apply these ligatures, he advises the tumor to be transfixed by an armed hermorrhoidal needle, and the ligature tied on either side; the use of the needle, however, must be avoided if possible. The ligatures being cut off short, the entire protruded mass should be pressed above the sphincter, the external flaps of skin cut off, and a pill of opium given, to allay peristaltic action. If the wound heals slowly, touch it lightly with the nitrate of silver, once or twice if necessary. This operation is said to give but little pain, and always to effect a complete and permanent cure.

It has recently been advised to paint the protruded membrane over its entire surface with nitric acid, and then pass it above the sphincter. This is said to give rise to little or no pain, while the cure is certain and lasting.

I will only add, upon this subject, that the use of chloroform in these operations has been recommended by some surgeons, and eschewed by others. It appears most advisable to avoid its use in the early part of the operation, when the tumor is to be seized and drawn as low as possible, and the assistance of the patient, by voluntarily bearing down, is required; but as soon as this is effected, and previous to ligation or the use of the knife, the anæsthetic should be given to prevent pain; while, by relaxing the sphincter, it will also facilitate reduction. In cases in which the bowel has become strangulated, every exertion must be made to reduce it early. Chloroform should be freely given, the taxis carefully resorted to, and if these measures fail, the sphincter muscle must be divided to a sufficient extent to relieve the bowel and admit of its reduction.

Piles.

Some difference of opinion exists, as to what a pile or hemorrhoidal tumor really is. There are surgeons who regard this as a tumor formed by the rupture of one or more of the small veins of the part, and consequent extravasation of blood in the cellular tissue between the muscular and internal coats of the rectum. Most generally, however, piles are regarded as the result of a varicose condition of the hemorrhoidal veins.

The rectum, from the very nature of its office in the economy, is so formed, that it may be very much dilated, and will immediately contract again. The result of this is, that the internal or mucous coat of the bowel, when not distended by the contents thereof, is very lax, and falls in folds around the interior of the tube. The muscular coat, on the contrary, is then firmly contracted. Thus the blood-vessels passing between these layers are constantly pressed from without, while all support is removed, at times, from their inner sides; nay, this is generally their condition. The veins from this part too, are not supplied with valves, and hence the blood by its own weight tends to produce distention of the hemorrhoidal veins. Every effort of the abdominal muscles too, has the same effect; while the passage of the feces through the bowel tends mechanically to force down and retain the blood in the hemorrhoidal vessels. Under these circumstances, it is not at all surprising to find the coats of the veins yielding becoming more or less distended and producing tumors of greater or less extent.

Piles have generally been divided into the *internal* and the *external*. The first generally remains above the sphincter, while the second are below it. The internal piles have again been divided into the *bleeding* and the *blind*, as they generally bleed at intervals, but do not always do so.

The affection, in each of its forms, may consist of a single tumor of small or large size, or the growths may be so numerous as completely to fill up and close the rectum or hang in clusters around the anus, while between these two extremes every grade in numbers may present themselves.

The internal pile is of a pale bluish or purple color, and is covered by a very thin layer of mucous membrane, so thin sometimes that the contained blood may ooze through it, and very often, under the pressure of the hardened descending feces, this thin covering gives way, and profuse hemorrhages occur. This form of pile arises within the sphincter, and is never covered by the skin.

The external variety, on the contrary, arises without the sphincter and is covered by the skin, which is generally thickened, hardened, and sometimes of a warty character. This form of pile never bleeds, unless from the application of violence, but is very painful if pressed upon. Like the internal form, it is apt to cause a sensation of heat and discomfort, often amounting to pain, in the tumor itself; the pain often darting upwards, affecting all the neighboring organs, and being frequently increased by standing or walking.

The internal pile sometimes descends, and is prevented from returning by the closure upon it of the sphincter ani; becomes strangulated, and, if not relieved, will inflame, die, and slough away. Indeed, the disease is sometimes cured by this accidental process.

In its first stage, this disease may consist simply of a varicose condition of the veins, causing longitudinal swellings along the surface of the bowel, and giving a knotty feeling to the interior of the rectum. These knots or bulbs soon enlarging, form soft and compressible tumors, at times increasing, then again diminishing in size, and easily emptied by pressure. Soon they become more decided, extend either longitudinally or in a spherical manner, and become firmer and firmer, by the increase of their cellular material and the deposition of plastic matter, until they resemble a sponge filled with blood. An artery is often found passing directly into the centre of the tumor.

In the external pile we are apt to find, that, from the amount of plastic deposit, the tumor has lost its cellular character in a great measure, and has hence become a tough, indurated mass, supplied with veins and having an artery passing into its centre.

With regard to the *causes* of piles, I will only observe that they are apt to result from anything calculated to cause an engorgement of the abdominal vessels, particularly the portal system; for, as has been already observed, the superior hemorrhoidal vein is without valves, and so these vessels are obliged to act under the pressure of the entire column of blood in the portal system. Piles may arise, too, from any cause producing a certain habit, or a lax state of the muscles. Thus, luxurious or sedentary habits with little exercise, and high living, are frequent causes of the affection; and hence the wealthy and idle, and the studious but secluded, are alike sufferers therefrom. Sex appears to have no influence as a cause, it being found more frequent among young men than young women, but oftener with middle aged and old women than with men at the same time of life.

The treatment may be divided into *palliative* and *curative.* Under the first head are included such measures as are calculated to produce regularity in the portal system, and keep up a moderately loose state of the bowels. Cooling and astringent lotions and injections, as local measures, and whatever, as free exercise, &c., shall serve to improve the general health, will be found useful.

The curative treatment consists in the complete removal of the disease, by the knife, ligature, or cautery. These measures were formerly applied indiscriminately to both forms of pile; modern surgeons, however, confine the use of the knife entirely to the external form of the disease, the internal being only removed by the ligature. The use of the cautery is seldom resorted to, except to check hemorrhage after one of the other operations. Formerly these forms of the operation were resorted to in both internal and external piles; but the excision of the internal tumor is found so invariably to bef ollowed by severe hemorrhage, that it has been quite abandoned in this form of the complaint, and the ligature used in its stead. Just the reverse is true of the external pile. Here the hemorrhage is seldom of great amount, and can always be controlled with ease. Hence the knife is preferred as more expeditious than any other method, and "it may be laid down as a rule in surgery that all external piles should be cut off, and all internal piles tied." (Erichsen.)

In operating for external piles, the patient should be placed on the side corresponding to that on which the tumor to be removed is, and an assistant by lifting the opposite buttock brings the hernorrhoides at once and plainly into view. The surgeon then seizing the tumors one by one with a pair of hooked dissecting forceps, and drawing them outward, divides their base or pedicle, and so removes the tumor. Should hemorrhage follow, it can easily be checked by torsion of the bleeding vessels, or ligation of them if necessary. Where the pedicle is narrow it will be most convenient to divide it with a pair of strong scissors, curved on the flat; but when the base is broad, the bistoury is more convenient.

Perhaps the best method is to combine the use of the ligature with that of the knife thus.—A needle armed with a double ligature is passed through the center of the pedicle or base of the tumor, as near its attachment as possible: the two ends of the ligatures are then tied on either side, and the section of the tumor made just outside of them. After the tumor is removed, simple dressing is all that will be required; the patient being kept quiet, and in bed, until the wounds heal.

When the piles are internal, the bowels having been well washed out by an enema, the patient is caused to sit over warm water, that the parts may be as much relaxed as possible, and then placed in the same position as for the above operation. The surgeon then takes his position, and the patient is directed to bear down as if at stool: the tumors are thus brought plainly into view; and being seized with the forceps, are drawn down as far as possible; a needle armed with a double ligature is passed through the base of the tumor, if it be broad and flat; and each segment is tied separately. When the base is not very wide, or the tumor is pediculated, each pile being in succession drawn forward should be tightly ligated, with silk or whip cord. The tumors being all tied, or as many as can be reached, the ligatures should be cut off short, the entire mass passed above the sphincter, and the patient kept quiet in bed, until the piles have sloughed away; which generally occurs between the sixth and ninth days. At the end of forty-eight hours, if the bowels have not been acted upon since the operation, a little castor oil may be given. After the tumors have sloughed, the small ulcerated surfaces thus left will soon heal and cause no trouble.

Metallic ligatures have been frequently substituted for the silk or whip cord, thin and very flexible silver or steel wire being used. This is applied around the tumors, and the ends are tightly twisted. The metallic ligature has the advantage of being tightened from day to day by twisting of its ends, and thus causes the tumor to slough in a shorter time. The ends of the wire, however, must be left out of the anus, and they often cause considerable irritation: in other respects the use of the metallic ligature differs in nothing from the same treatment with silk, &c. Good, strong, but moderately small whip cord is generally preferred.

After the pile is tied, irritation about the neck of the bladder sometimes arises. This will generally be relieved by a warm hip bath, followed by an emollient application over the pubis, and a full dose of anodyne. Erichsen recommends hyosciamus and nitric ether. In cases in which the pile is too high up to be ligated, or is of a granular nature, or where the tumor is broad and flat, it has been advised to apply nitric acid to the surface of the tumor, care being taken that the acid touches no part but this. To effect this, a cylindrical speculum ani with an oval or oblong opening near its extremity is used. This being introduced into the rectum, the pile is made to fall into and protrude through this opening, and the acid is applied through the speculum on the protruding part. The part should immediately be cleansed by lint saturated with a solution of prepared chalk, and the speculum removed. The eschar, and consequent contraction, is said sometimes to effect a cure. If the acid is prevented from coming in contact with any other part, the operation will cause no pain.

In cases of internal pile hanging very low, or in what some surgeons call *entero-external piles,* as well as in very vascular external ones, a combination of the ligature and excision is often resorted to. The tumor being transfixed by a needle with a double ligature, is tied around its base as above described, and then divided by the bistoury just outside the ligature, which is left to slough off.

If undisturbed, piles sometimes become cured by an atrophy of the sac after being ruptured; or the tumor may slough and ulcerate; and the ulcerated surface, by healing and contracting, may prevent a return of the disease. Under other circumstances, the ulcer grows deeper and deeper, and the contents of the rectum are from time to time lodged therein, until at last, a *fistula in ano* is formed. These cases, however, are exceptions to the rule; for generally, if not treated, piles will gradually increase, grow worse up to a certain point, and then for years remain apparently stationary, only causing trouble by the local irritation and pain to which they give rise.

Polypus in Ano.

Polypi are sometimes found growing from the mucous membrane of the rectum, being most frequently observed just within the sphincter. They may be removed by the ligature or excision, and caustic also has been used with success.

The bowels having been emptied, as in the operation for piles, the patient by a voluntary effort forces the tumor down, and the surgeon seizes it with a vulsellum, or hooked forceps, and draws it steadily down until the pedicle can be easily reached. Around this, the ligature should then be tightly applied, the ends cut off, and the mass returned at once above sphincter, and left to ulcerate and fall off. When excision is preferred, the tumor is drawn forcibly down, as in the preceding case, and its pedicle divided by a pair of scissors curved on the flat.

The after treatment differs in no respect from that for piles.

Perhaps it would be best to combine the use of the ligature with that of the knife, ligating the tumor first, and then cutting it off. In this case, the bistoury should be passed sufficiently far from the ligature to ensure the remaining of the latter in its proper position;

if passed too near, the ligature will fall off on the contraction and shrinking of the tissues after the section has been made.

Stricture of the Anus and Rectum.

As the result of healing after extensive ulceration, or the contraction of the cicatrix after burns or wounds, the sphincter ani sometimes becomes so much contracted, as materially to lessen the size of the anus.

Under these circumstances, all that can be done is carefully to dilate the anus, by the persevering and continued use of masses of lint, gum elastic bougies, sponge tents, &c.

Stricture of the rectum may be the result of a closure of its calibre by a simple fibrinous deposit, or from malignant cancerous disease of the rectum. The simple form of this disease may occur at any part of the rectum, in either sex, or at any age. It is, however, most commonly found from two to six inches above the anus, and in females rather advanced in life.

The stricture may consist of a membrane apparently stretching across the tube on one side, and thus narrowing it; or it may extend quite across the rectum, leaving only a slight opening, which resembles a hole through the membrane at its centre. Again; the stricture may result from the coats of the bowel being, as it were, drawn in towards each other, and approaching sometimes so near that only a very small opening, or passage between them, is left.

The *symptoms* of stricture are the same as those accompanying constipation from any other cause: but that which points most forcibly to this as the disease, is, the gradual and constantly increasing difficulty in defecation. At first some effort on going to stool is necessary, but with a little exertion the feces are passed, somewhat flattened, perhaps, and it may be slightly stained with blood. At each successive motion the effort necessarily becomes greater, and the amount of feces passed grows less, until extreme exertion is required, and only a few very hard scybala are forced away. Occasionally a slight watery diarrhœa may exist. The case thus grows worse and worse, until it must either be relieved, or it causes death.

Two methods of treatment are recommended; dilatation, and the knife. The first can be resorted to in all cases,—the last, only when the stricture is low down, and can be easily reached by the finger.

In using dilatation there can be no difficulty, if the stricture can be reached by the finger, as a probe can easily be introduced thereon, and carefully insinuated beyond the stricture. Where the difficulty exists higher up and beyond the reach of the finger, the case is much more difficult; for the probe must then be passed alone, its course necessarily becomes uncertain, and the difficulty is increased by the point catching in the mucous folds of the intestine. When once passed, the probe should be retained for a short time and then withdrawn, and introduced again about every second day; the size being increased each time.

As a modification of this method, it has been proposed, to introduce upon a probe a long narrow linen bag, until it has passed considerably beyond the seat of stricture; the staff or probe being then withdrawn, and the bag filled to distention with small pieces of lint, and so caused to dilate the stricture.

Whatever may be the peculiar mode adopted, the principle of all these operations is the same. They all have as their object the dilating of the tube, and effect this by the introduction from time to time, of some form of instrument, which is regularly increased in size.

Where the stricture is treated by the knife, the finger well oiled, should be passed gently but quickly through the anus, and carried at once to the seat of stricture. A probe-pointed bistoury, guarded by linen to within a short distance of its point, should then be carried on the finger, as a guide, in to the stricture, and its point carefully insinuated through it; the unguarded cutting edge being then brought to bear on the constricting surface, so as to divide it to a slight extent. This may be done only at the lower centre of the tube, or there and above, or above, below, and on either side, as may appear to be necessary in each case. The knife should be withdrawn on the finger, and a probe introduced. This should be worn for a short time, and withdrawn, being subsequently introduced on every second day, until the parts are quite healed. The patient, during the operation, should lie as though undergoing perineal lithotomy.

Erichsen recommends, that where dilatation is used, and the stricture yields slowly, being hard and indurated, the knife be introduced, and a notch made on the posterior surface of the stricture. A tent of compressed sponge should then be introduced, and worn for twelve hours, after which the use of the probe should be resumed. The two methods are thus united, and no doubt the cure is expedited thereby.

If left untreated, stricture of the rectum may in a few rare cases be spontaneously relieved, or suddenly cause complete closure of the bowel, and so produce death. Generally the constriction goes on gradually increasing, until after some time total occlusion takes place. Abscess sometimes forms above the seat of stricture, descends, and bursts in the vagina; or it points in the nates, or internally in the pelvis, causing a large discharge of pus, and rapidly producing hectic, which is soon followed by death. Life may also be destroyed by the supervention of peritonitis. This affection should then never be neglected, or its thorough treatment postponed, as its tendency most undoubtedly is to cause death.

Fistula in Ano.

There are three varietes of this affection; the *blind internal*, the *blind external*, and the *complete*. In the first two, or *blind* fistulæ, there is but one opening into the sinus. In the blind internal, this opening is in the interior of the rectum; whilst in the external variety, the sinus opens externally, somewhere in the neighborhood of the anus. In the complete, the sinus is open at both ends, one end communicating with the bowel, the other opening externally.

These fistulæ vary greatly in their extent, sometimes consisting only of a short sinus in the submucous cellular tissue about the anus, and only extending for a short distance along the course of the rectum. This form of fistula is generally the result of small abscesses forming about the part, and not being properly cured. In other cases, the disease consists of extensive burrowing sinuses, which reach to some distance from the sphincter, and run for an inch or more up along the rectum. In these latter cases, it will generally be found that stricture of the intestine exists.

In the *blind internal* variety, the patient suffers from occasional burning and constant tenderness over the seat of the sinus. At longer or shorter intervals, there are discharges of pus from the anus; and this discharge may be produced at any time, by pressing over the seat of the sinus. By introducing the finger and examining carefully, the seat of the opening can generally be detected. In the *external blind* variety, the opening into the sinus is evident, and it will attract notice by the pain and discharge it causes. On introducing a probe, it is found only to penetrate to the bottom of the sinus, and not to enter the cavity of the rectum. In the *complete* variety, on the contrary, the probe, if introduced into the sinus through its external opening, can be readily passed into the rectum, and detected by the finger passed therein.

In cases of blind internal fistula, it is advised to convert the blind into the complete variety, by opening into the sinus from without, after which the case should be treated as if originally one of that variety.

In cases of blind external fistulæ, we may resort to the use of caustic, dilatation, the bistoury; or we may convert them into the complete variety. When caustic is preferred, the interior of the sinus may be touched with lunar caustic, or pencilled with nitric acid. The lining membrane is thus destroyed; and when the sinus is small and superficial, it may effect a cure. When caustic fails, it has been advised to lay open the sinus freely, and produce a closure thereof by granulation.

Where these methods fail, the only sure plan is to convert the fistula into a complete one, and treat it as such. For this purpose, a piece of round, hard wood, having on one side a deep groove ending abruptly near its point, should be passed into the rectum as a sound. This must be passed up the bowel until the end of the groove is above the spot at which the internal opening is to be made. A pointed bistoury, long, narrow, and slightly curved, should then be passed, with its cutting edge turned downward, through the sinus, until its point reaches the rectum; through the walls of which it must then be forced, and its point lodged in the groove of the wooden director or sound. This will be easily effected, by pressing the point of the knife slightly against the sound and at the same time turning the latter, until the point of the knife is felt to slip into the groove. The operation may then be completed at once by simultaneously withdrawing the knife and sound together, the handle of the knife being elevated, while its point is kept firmly pressed into the groove of the sound. All the tissues between the sinus and rectum are thus by one stroke divided, and the sinus and rectum converted into one. The after treatment is the same as that after the similar operation for the cure of complete fistula.

For the cure of complete fistula, two methods of operating have been proposed and practiced; by the *ligature*, and by the *knife*.

The first is very tedious, and should only be resorted to when, from the fears of the patient or some other cause, the knife cannot be used. The operation consists in passing a ligature of silk or metallic wire through the sinus from the external to the internal opening; its end in the rectum is caught by the finger passed up the tube, and brought out at the anus. If the ligature is of silk, its ends are tied; if of wire, twisted slightly together; and it is tightened from time to time, until it cuts out. This is a very painful and slow process; indeed, so painful does it become when the skin only remains, and is pressed upon by the ligature, that the operation is often, at the request of the patient, brought quickly to an end, by dividing this with the knife.

When the knife is used, the patient should lie on his side in bed near the edge, or may rest on his knees in a chair, with his arms over its back; indeed, he may be placed in any position that shall fully expose the rectum to the view and manipulation of the surgeon and his assistant. A very convenient plan—and one with which I have succeeded where the involuntary actions of the patient (a muscular negro fellow) could by no other means be overcome—is to spread a blanket over a long narrow table, and cause the patient to lie on his belly thereon, the feet and legs hanging over one end, and the buttocks resting near the edge. The patient is then directed to grasp the table with his arms, and an assistant on either side places one hand on the shoulder, and the other on the buttock or loin, and so easily controls the patient's movements. The surgeon then, standing behind the patient, passes a probe-pointed bistoury through the sinus, until its point enters the rectum; and the right index finger is then passed up that tube until it reaches the point of the bistoury, over which it should be hooked. The handle of the knife being then pressed firmly upwards towards the buttocks and the point simultaneously drawn downwards by the finger in the bowel, both are brought out together at the anus. The sinus and rectum are thus laid into one, by the severing of all the structures between them.

When the internal opening is near the anus, a convenient method will be, to use, as has been advised, a very flexible silver director, as a probe; and this should be passed through the sinus into the rectum, where its point must be caught by the finger, forcibly bent downwards, and brought out at the anus. The ends of the director should then be drawn forcibly forwards, and the structures, thus elevated, divided by a short, straight, and wide-bladed bistoury. The cutting out of the director ensures the perfect division of all the fibres, and hence the opening of the sinus to its full extent. The wound should be filled from the bottom, with lint well oiled, and caused to heal by granulation. Great care must be taken to prevent the sides of the wound from coming in contact, healing, and so leaving a cavity below. Simple water dressing is all that is required. The operation over, and the wound dressed, the patient should be put to bed, and kept perfectly quiet. Opiates should be given to restrain the action of the bowels until about the third day, when a mild laxative may be given, if necessary. The first action of the bowels will generally empty the wound; and it should be dressed again from the bottom, care being taken to prevent its healing first above. A very good method of effecting this is, to introduce a probe daily to the bottom of the wound, and to move it gently from side to side. Should hemorrhage follow the operation, the rectum must be tightly plugged with lint.

After the wound has healed, the only inconvenience that may remain, is an incontinence of the watery and gaseous contents of the bowels, which sometimes occurs. In some rare cases, even fecal matter escapes. This difficulty results from the angles of the wound through the sphincter muscle projecting slightly, and so causing a small opening; but this difficulty will wear away after a short time.

Where there is but one external and several internal openings from the sinus, or where, with but one external and one internal opening, several sinuses exist, running along the course of the rectum, the case should be reduced to one of simple complete fistula (by laying the several sinuses open into one,) and treated accordingly.

Recto-Vesical Fistula.

This is fortunately a rare affection; occurring, generally, as the result of a malignant disease or of a wound. The symptoms of the complaint are marked, and cannot be misunderstood. The urine escapes from the rectum in greater or less amount, as the opening between the viscera is larger or smaller; and where the fistula is very extensive, especially if the result of cancer, fecal matter may escape from the bowel to the bladder, and be discharged through the urethra with the urine. The constant dripping away of the urine is very apt, too, to excoriate the parts around the anus, and so cause much suffering; while the constant wetting of the cloths by that liquid causes the patient constantly to be annoyed by an unpleasant urinous odor. Where the first symptom above mentioned exists in combination with the others, or alone, the nature of the disease can scarcely be doubted. but will be easily rendered certain, by an examination of the rectum, with the finger or speculum.

The treatment of this form of fistula is always tedious and uncertain; but when the opening in the viscera results from cancer, a cure cannot be hoped for, and all that can be done is, by the use of anodynes, and a strict attention to cleanliness, to detract as much as may be from the patient's sufferings.

If the fistula is the result of some other cause, and is small, it will frequently yield under the use of nitrate of silver, carefully applied around its edges through a speculum. The similar use of a white hot wire has also been recommended. If these methods fail, or are not thought advisable, it has been recommended to introduce a grooved staff through the urethra into the bladder, and to divide the sphincter and tissues thereon, so as to convert the fistula into a perineal one, which should be healed, by granulation, from the bottom.

Vesico-Vaginal Fistulæ.

These generally result from long continued pressure upon the parts, by the fœtal head during labor, or from the unskilful use of obstetrical instruments. The affection may, however, result from accident or disease. The urine is found to drip away through the vagina, and upon examination by the touch or with the speculum, the fistula is observed. Of the several methods proposed for the cure of this melancholy accident, not one can be with certainty relied on. The most successful means, however, are afforded by caustic and the use of sutures. Malgaigne also speaks with favor of Dessault's method, which is to keep the lips of the fistula in close contact, by passing a cylindrical plug into the vagina so as to press the anterior edge of the wound against the posterior, a sound having been previously placed in the bladder and kept constantly there, to prevent any accumulation of urine. The sound should be kept in its position by means of a "curved metallic support attached to a truss, and the end of this support pressed on the vulva receives the handle of the catheter in a hole made on purpose." (Malgaigne.)

Where the injury is recent and of small extent, cauterization, first recommended by Dupuytren, appears to offer the best means of relief. Either the actual cautery or caustic substances may be used; but care should be taken in using either, so to apply them along the edges of the fistula, that no slough may be formed; for if sloughing should occur the operation will do harm. Where caustic is used, the nitrate of silver is generally preferred. This should, with an ordinary pair of forceps, be carried through a speculum, and applied over the entire edges of the wound, the caustic being placed at right angles with the blades of the forceps. Should the opening grow smaller after the application, it may be repeated as soon as the effects of the first appear to have worn off; but should the wound grow larger, the caustic should be discontinued.

Attempts to cure this affection by the use of sutures, have so generally failed, that it is unnecessary to do more than allude, in general terms, to the method in which they are performed. Two distinct steps mark the operation. The first consists in the paring off of the edges of the fistula, so as to convert them into raw surfaces. The second step includes all measures used to bring these together by the application of sutures. Malagodi, Roux and others have devised various measures for accomplishing the one, while the ingenuity of Ludzinsky, Beaumont, Naegele, and many more, has been taxed in vain, to discover an efficient method of effecting the other.

At present, the operations of M. Jobert are resorted to with the greatest prospect of success. In the one of these, a flap is cut from the labia majora, and the fistulous edges having been pared, it is turned thereinto by twisting its pedicle, and secured in situ with sutures. The opening is thus plugged up, and as soon as the flap becomes fixed, by healing, the pedicle is divided. Should this method fail, M. Jobert resorts to his second operation, which consists in making a semilunar incision over the anterior surface of the cervix uteri where it joins the vagina, and dissecting a flap upwards; when, by drawing the anterior portion of the vagina downward, the end may be fixed by suture to the edge of the fistula, and so close the opening.

Under any circumstances, these autoplastic operations of M. Jobert furnish the most hopeful resource; but where there has been much loss of structure, and the opening is very large, they furnish the only means by which a cure can possibly be effected.

The use of the uniting apparatus, obliteration of the vagina and several other methods have been proposed for the cure of this affection; but they are now regarded only as matters of surgical history.

Recto-Vaginal Fistula.

By long continued pressure during labor, or perhaps from some other cause, the septum between the vagina and rectum is sometimes destroyed, causing a *recto-vaginal fistula.* Here the opening may be closed by paring its edges, and using sutures to secure them in contact; or the same plan may be adopted as in the former affection.

After the operation, the sphincter ani should be divided, and the patient put to bed; an opiate should be given to prevent the action of the bowels, and the patient kept perfectly quiet for several days. If the bowels have not acted at the end of three days, a very mild laxative may be given, or an oleaginous enema used.

The sphincter ani should always be divided, and every exertion made to restrain or prevent any muscular action about the parts, until union has taken place. The urine should be drawn off by the catheter, at least twice a day during the treatment.

Should the operation only succeed partially, the opening still remaining, but of reduced size, the nitrate of silver may be gently applied around its edges, and closure thus induced. If this fails, we have only to wait until the parts have properly healed, and then to repeat the operation. This we should do again and again if necessary. The patient should never be left to her fate while there remains a single chance or hope of cure, and as long as her health is good and the parts around the fistula remain sound and continue to heal kindly, we need not despair of eventual success.

CONGENITAL MALFORMATIONS.

Narrowing of the Anus—Closure of Anus—Absence of Rectum.

Infants sometimes suffer from symptoms of violent constipation soon after birth, and, when examined, are found to suffer from one or other of the above malformations.

When the anus is *narrowed,* the meconium is observed to ooze through a small opening at the usual seat of the anus, through which a probe may easily be passed into the rectum.

This narrowing of the anus is generally caused by a thin membrane, passing more or less across it. Under these circumstances, a probe-pointed bistoury should be introduced through the orifice, and the membrane divided by a crucial incision. The angles of the membrane should then be removed with a pair of scissors, and the anus dilated by a niche of lint or piece of compressed sponge, a bougie being afterwards introduced, from day to day, to prevent any subsequent narrowing or contraction of the opening from occurring.

In other cases, the anus is completely closed, by a thin membrane stretching entirely across it, and preventing the slightest escape of meconium. Generally there is, in the place of the anus and marking the centre of the membrane, a small bluish or dark looking spot, at which the membrane appears thinner than elsewhere, and where fluctuation can be felt. A small sharp-pointed bistoury should be introduced at this spot, and the membrane completely divided by a crucial incision. The angles of the membrane should then be cut away, and the patient treated as in the former case.

It occasionally happens, that an infant may suffer from most obstinate constipation, and yet the anal orifice appear perfectly natural and sufficiently open. In these cases, very careful examination should be made, as it sometimes happens, that, though the anus is perfectly formed, yet the rectum is closed by a septum passing completely across it some distance within the anus. This malformation can only be detected by introducing a probe or perhaps the end of the little finger into the rectum, and actually feeling the membrane.

A small trocar should be carefully passed through the membrane, and the opening thus made dilated by the use of niches of lint, sponge, tent, or bougies.

A much more serious malformation is where the anus is entirely wanting, and the rectum terminates in a cul-de-sac some distance above its usual outlet. Here we should make, just in front of the end of the coccyx, an incision about an inch long. This should be very carefully deepened, the curve of the pelvic axis being kept in mind and followed, and the end of the rectum sought. When found, this should be punctured, and its mucous membrane carefully drawn down and fastened by sutures to the orifice of the external wound. The opening thus formed should be carefully kept open, by niches of lint, sponge tents, or bougies. These should be perseveringly introduced daily until all tendency to narrowing has been overcome or destroyed. If this precaution is neglected, the artificial passage will gradually contract until it becomes nothing more than a fistulous opening.

Great importance is attached to bringing down the mucous membrane of the rectum, and causing the artificial tube to be lined therewith. Thus the alvine discharges are prevented from causing the irritation which they certainly would produce if they passed freely over a raw surface surrounded by cellular tissue. The operation is said frequently to have failed and death resulted, only because this precaution was omitted.

By far the most serious malformation that may befall an infant, is that in which the intestines appear to have been arrested in their development, and end in a slight bulb or distention at the extremity of the colon, both the rectum and anus being quite wanting. In these cases surgery offers but one resource, and life can only be preserved by the formation, as already described, of an artificial anus. T. S. W.

LECTURE LXV.

HYDROCELE—ITS VARIETIES—CONGENITAL HYDROCELE—CAUSES OF HYDROCELE—DIAGNOSIS—TREATMENT—HYDROCELE OF THE CORD—ITS TREATMENT.

We have this morning, gentlemen, to enter upon the subject of *hydrocele.* This is a *watery tumor* within the scrotum;—a collection of water in the *tunica vaginalis testis.* Throughout our whole country there is perhaps no more common affection than this, and though it does not endanger life, it, nevertheless, causes great inconvenience. I have stated that hydrocele is a collection of water in the tunica vaginalis; but when we consider it in all its various phases, we find that, though this is its most common seat, there are cases in which its position changes. It becomes necessary, therefore, to enter into a consideration of these varieties with some detail.

There are cases in which the cellular tissue of the scrotum is the seat of the effusion, sometimes in the form of cells, and sometimes in isolated cysts. Where the collection is in the tunica vaginalis, instead of forming one large sac, this cavity may be divided by it into various cells, some communicating with their neighbors, others not, and all filled with a limpid fluid. This is *cellular* hydrocele. Again: hydrocele, instead of occupying the tunica vaginalis, may be developed along the course of the cord. This form of hydrocele is, under ordinary circumstances, nothing more than an encysted tumor, composed of serous cysts, which are formed either at the expense of the cellular tissue of the cord, or from the portion of peritoneum which is pushed before the testicle in its descent.

To enable us to understand the leading characteristics of hydrocele, as it generally falls under our observation, it is necessary to understand the relative arrangements of the tunica vaginalis and the testis, as it will also be necessary to understand the different relations of the peritoneum with the testis, during the first four months of fœtal life, and subsequently. During these first months, we find the testis in the cavity of the abdomen below the kidneys, on each side of the vertebral column, and if we make a vertical section through the body, we see the testis in the lumbar region, the peritoneum, instead of passing behind, being reflected over it in front. This is the position of the testis in the four first months of utero-gestation. After this, owing to causes which act upon the testicle, and particularly owing to the gubernaculum testis, this organ descends towards the groin; and, when it arrives there, being still acted upon, it engages in the ring, and ultimately descends completely into the scrotum. Thus, in the primary condition of these parts, there is a perfect communication between the cavity of the peritoneum and that of the tunica vaginalis; but the cord eventually becoming adherent to the peritoneum at the ring, the connection between the cavities is entirely obliterated. Now, it is in this cavity of the tunica vaginalis, that the accumulation of water takes place. It consists, at first, of the natural serous secretion, but gradually goes on increasing, until it forms a large tumor.

In some cases, however, we find hydrocele under different circumstances; as, for example, where there is a free communication between the cavity of the tunica vaginalis and that of the peritoneum. A child, at birth, may present a hydrocele of this kind; as may be inferred from the circumstance, that when placed on its back the tumor disappears, its contents being acted upon by the influence of gravitation. Sometimes this condition becomes permanent, so that the individual has a *congenital hydrocele.* This form of hydrocele may also occur without there being any communication between the two cavities at the period of birth.

What, in the next place, are the *causes* of this affection? As you will readily perceive, any thing which may cause inflammation of the tunica vaginalis, as a wound, a blow, inflammation of the testicle, &c. But by far the most frequent cause of hydrocele is, inflammation of the urethra. Let us see what is the reason of this. We have, passing from each testicle, its proper excretory tube, or *vas deferens.* Now this vas deferens is lined by a mucous membrane; and when inflammation attacks the mucous membrane about the urethra, it extends along the vas deferens to the epididymis, and thence to the tunica vaginalis. I would say from my own experience, that perhaps nine out of ten cases of hydrocele, owe their origin to inflammation about the prostatic portion of the urethra. As analogous to this, I may remind you, that from an attack of gonorrhœa a person will frequently suffer from orchitis. This proceeds from the same cause, and extends through the same channel. As regards the *diagnosis,* I need not say much; for, in my remarks the other day on hernia, I alluded to most of the symptoms. First, we have the pyri-form shape of the tumor; secondly, its fluctuation; and thirdly, its transparency. These are the principal symptoms. And let me advise you, gentlemen, always to darken the room, when you wish to examine the transparency of the tumor; when, taking a candle, and shading the eyes, you will find, in hydrocele, that the whole tumor transmits the light, except the back and upper portion, which is occupied by the testicle. This is *generally* the case. But I should remark, that the position of the testicle varies, and that it is *sometimes* found in front.

There is another circumstance to which I would allude. It generally happens, that, when hydrocele has existed for a length of time, all of the structures of the scrotum become so much thickened, that it may be impossible for light to be transmitted through them. But here, if you take into consideration the fluctuation in the tumor, and its weight when compared to its size, you can easily distinguish it from cancer of the testicle, or from orchitis. With regard to hernia, the gurgling noise made on its return, and the different shape of the tumor, render it easy to be distinguished.

But not to dwell longer on this subject, let us pass on to the *treatment* of hydrocele. We find laid down in the books, two chief methods; the *palliative,* and the *curative.* The palliative consists merely, in emptying the sac from time to time. This is done by a simple puncture with a lancet, or a trocar. You may draw off the water, by holding the tumor in the palm of the left hand, drawing the integuments tight, with the thumb and finger, and thrusting in a trocar, in such a manner that the point shall pass obliquely upwards. Or you may make a simple puncture with an ordinary lancet. All that this method can accomplish, is to relieve for a few days. The disease will sooner or later return.

Another palliative means, which has been recommended where ordinary stimulating lotions fail, is *acupuncture.* By this means, however, we do not simply draw off the water, but cause, in addition, a sufficient degree of inflammation to procure an obliteration of the sac by adhesion. This method, therefore, belongs properly speaking, to the list for effecting a radical cure.

With regard to the means for accomplishing *this* object, there are many expedients. One method is, by the use of a seton; another is, by incision; another, by incision and excision—that is, by laying open the sac, and cutting out a portion of the tunica vaginalis; another is, by incision with the use of a tent—that is, by laying open the sac, and placing in it a piece of lint, called a tent; another is, to insert a bougie through the puncture; and another, to puncture with a trocar, and throw into the sac some stimulating lotion. When we come to review all these plans, we find that we have a very wide field for choice. As a general rule, when the sides of the sac are not too callous for adhesion to be procured, the method by injection is the best. It is less painful; keeps the patient laid up a shorter time; and does not expose him to the risk of inflammation or gangrene. But when the structures are so much thickened, and have become so callous, that this fails, we must fall back to the operation by incision and excision. We shall, therefore, at once describe this operation.

Having placed the patient on his back with his lower limbs drawn up, seize the tumor in the left hand, and carry an incision from its apex to its base, extending through the integuments of the scrotum to—but not through—the tunica vaginalis. Having dissected back the integuments on either side, and opened the tunic, cut out the whole or a part of the membrane thus exposed, taking care not to go too near the epididymis. Having thus excised a portion of the sac, fill the cavity with oiled lint, and draw the edges slightly together. Keep in the lint until granulation, or incipient suppuration, comes on; and then remove the lint, and apply light dressings. When the wound heals, the sac will be entirely obliterated; and thus all re-accumulation of water will be prevented. When the operation is by incision only, the incipient steps are precisely the same. Having laid bare the sac, cut into the tumor, let out the water, and then fill up the cavity with lint, as in the preceding case. There are two methods of operating by seton. In the first and most usual, having punctured the tumor with a trocar, we pass in a seton, and leave it in situ for a sufficient length of time to produce adhesive inflammation. Another method is to use but a single thread. Both act in the same way. Being foreign bodies, they cause inflammation; which results in the obliteration of the cavity by adhesion. This is the object of all these operations. The operation by seton is only applicable to small and recent cases. In these, it may bring about such inflammation, as shall cause a radical cure.

But by far the best means of procuring this result is the method of puncturing with a trocar and throwing in an injection. We have a great variety of substances recommended for these injections. When the operation was first performed, it was recommended to use one part of wine, and two parts of water. The red wines were generally preferred. Port wine, tinct. of myrrh, warm wine, diluted alcohol, all have the same object in view; and cures have often followed the use of each of them. Where they fail, it may be because the trocar has slipped out, and its point has been left between the integuments and the tunica vaginalis; from which cause, the injection has been thrown into the cellular tissue, and not the cavity of the tunica vaginalis. This accident, as you will readily perceive, will soon give rise to extensive sloughing of the integuments of the scrotum; and, what is worse, after all this, the hydrocele will not be cured. It will soon return, the same as before. At the present time, all these injections are pretty much abandoned by surgeons generally, and the injection of the tinct. of iodine is substituted. This practice was first adopted in India, and is one which has been frequently resorted to by myself. I should state, that there is a difference of opinion among surgeons, as to the proper strength at which the injection should be used. Some prefer a weak solution, which they allow to remain for a short time, and then draw off; others use a strong solution, and allow it to remain. I prefer the latter plan, and seldom dilute the ordinary tincture more than one half. Throwing in from two to four ounces, I withdraw the canula, leaving the iodine in the cavity. It is soon carried off by absorption; and I have yet seen no reason to believe, that any evil results follow this practice. I would say to you, therefore, use a third or a half proportion of water, and allow it to remain in the cavity. There is, however, one point to which I would call your attention. The object of this operation is to create an inflammation, the result of which is, that, in a few hours after the operation, the tumor will be as large as before it. When this inflammation runs too high, you must combat it by the usual antiphlogistic treatment; and when, after several days, the fluid still distends the sac, and is not absorbed, you should puncture it with a lancet or trocar, and draw off the liquid. The lancet will be found the best instrument for you to use. During the inflammatory action, the patient should be constantly confined to the horizontal position, and the scrotum must be supported by a bolster. Some persons use a T bandage: but this, I think, is unnecessary. Cases may occur, in which the inflammation runs so high as to require the use of leeches: and, when sloughing takes place, it must be treated by the ordinary rules.

In cases of hydrocele of the cord, the operation by tent, or that by injection, will, either of them, do very well. But if the hydrocele is congenital, I should be very unwilling to use the injection at all. Some recommend the use of the injection, in these cases, but with the precaution of pressing on the ring, to prevent it from entering the abdomen. When it is necessary to operate in these cases, I should prefer the incision, with the use of a tent.

We sometimes meet with cases resembling hydrocele, in which the wall of the tumor is formed by the proper membranes of the testis, instead of by the tunica vaginalis. The testis here forms a serous cyst; and no operation for hydrocele will be of any avail. Where you find this to be the case, you should, at once, resort to castration; as there is no good to be gained by delay, and the organ is useless, even if left, being also very prone, under these circumstances, to take on a malignant degeneration.

At the next lecture, we shall go on to some other varieties of disease of the testicle and cord.

LECTURE LXVI.

VARICOCELE OR CIRCOCELE—ITS SYMPTOMS AND TREATMENT—OPERATION OF BRESCHET—METHOD OF WARREN—ENLARGEMENTS OF THE TESTICLE—CAUSES—HEMATOCELE—MALIGNANT DEPOSITES IN THE TESTICLE—FUNGUS IN THE TESTICLE—TREATMENT—CASTRATION—TREATMENT AFTER THE OPERATION—RESULTS OF THE OPERATION—DISEASES OF THE PENIS—PHYMOSIS—ITS RESULTS—ITS TREATMENT—PARAPHYMOSIS—RESULTS—TREATMENT.

Varicocele.

You will very often, gentlemen, meet with a pathological state of the veins of the cord, in which their coats become very much distended, and which may cause them to form a tumor of such extent, sometimes, as to hang half way down the thigh. To this condition of the cord, we give the name of *varicocele*, or *circocele*, from its knotty feeling. Where it is of limited extent, it is a matter of little importance; but where it continues for many years, and the valves become unable to resist the gravity of the blood, the patient is exposed to great inconvenience; and, from the circulation being impaired, the testicle may sometimes, though not often, lose its functions.

This circocele, in infants, is a matter of very little consequence; for, after a short time, it disappears spontaneously. When it does not do so, use a supporting bandage, and moisten it with some astringent lotion.

When the varicocele has been of long standing, it may be necessary to resort to more potent means. A variety of expedients have been proposed from time to time. Most of them have the same object in view, viz: to destroy those parts of the veins, which are most diseased. Some persons resort to the ligature of some of the veins. But, in consequence of the aptness of these veins to take on inflammation, and the proneness of this inflammation to extend and be increased by a ligature of the veins, I would not recommend this plan.

Another expedient is, to obliterate the veins by pressure. This method is recommended by M. Breschet. He uses several small steel clamps. Having caused the patient to lie on his back, he pinches up a fold of the skin of the scrotum containing the veins—taking care to leave the vas deferens behind—and then places these veins, thus enclosed in a fold of the scrotum, between the clamps; which should then be tightened. One of these clamps should be fixed on the upper portion, and another near the base of the scrotum; and they should be left on for at least forty hours. When removed, the eschar will slough off, leaving an ulcer, which will soon heal. That part of the vein which was included between the upper and lower clamps, gradually wastes away, and the disease disappears. This operation may succeed very well. But you will find, that, from the length of time that pressure is kept up on the skin, inflammation and sloughing of this membrane is apt to occur; and this may extend to the scrotum. I would not, therefore, as an ordinary rule, recommend the operation of Breschet.

Another expedient is, to use a needle, with the twisted suture; the vein and a fold of skin being included by it in a figure-of-eight. This operation, however, is quite too painful. Another, and far better method is, to pinch up a fold containing the veins, and then run a needle through beneath the veins, and pass a figure-of-eight suture over the vein and under the points of the needles. This is the best and safest method; and, if properly applied, it will generally succeed. I would, however, caution you, in this disease, always to think calmly and well of the serious results that may follow even the simplest expedient.

Another method, recommended by Ægineta, and frequently adopted by Warren, of Boston, consists in seizing a portion of the integuments containing the veins, and sweeping off veins, integuments, and all, stopping the hemorrhage by means of pressure. This is a very effectual method. But I will repeat, that, in the management of varicocele, you should not think of operating, except in very extreme cases. Dangerous results may follow even the most simple operation. I make this remark, from having had some experience of its importance.

It has also been proposed, to excise a portion of integument from over the surface of the cord, of such extent, that, when the edges are brought together and cicatrized, the pressure on the parts beneath shall be sufficient to support the veins and prevent their over distension. This method has been generally ascribed to Sir Astley Cooper, but the priority of the operation is due to my friend, Dr. O. Broyles, of this State, whose claim dates back as far as the year 1821. I have seen the subject of his operation within the last two years, who has been permanently relieved by it.

Affections of the Testicles.

In this connection, I wish to make a few remarks on some of the *pathological conditions* of the testicle itself. These are so numerous and diversified, that it will be impossible to do more than make a few cursory remarks upon some of them. We find, sometimes, that the testicle becomes very much enlarged and indurated, from an adventitious deposit. Now, where this consists only of a simple enlargement or induration, some patients may wear such a testicle for years, without much inconvenience. But sometimes it is very painful, and may cause the individual to fall into very bad health. Here it becomes necessary to remove the gland. Again: in some cases of enlargement, we find, deposited in the gland, numerous cysts. Sometimes these are filled with serum, and sometimes they contain a thick and ropy mucus. Sometimes the enlargement is scrofulous, and sometimes it is caused by entozoa. Cases have occurred, in which all the elements of the *embryo* were found imbedded in the testicle. Now, where there is any danger of this enlargement being transformed into a malignant degeneration, it also becomes necessary to extirpate the gland.

It sometimes happens, that, from a change in the textures of the testicle, its blood-vessels give way, and blood escapes and accumulates in the tunics. Thise scape of blood gradually increases, until a large tumor, quite void of transparency, is formed; and the testicle becomes atrophied by the pressure it exerts. Here we have what is known as an *hematocele,* or a bloody tumor of the testicle. I have seen many such cases; and in several of them, I have commenced to operate for old hydrocele. In such cases as these, again, the only resort will be, a removal of the gland.

With regard to this *hematocele,* I would remark, however, that there is another variety; in which, the blood is accumulated in the cavity of the tunica vaginalis In this form of the affection, all that is necessary is, to lay open the sac, as in hydrocele, turn out the blood, put in a piece of lint, and heal by granulation.

Besides these varieties of morbid states of the testis, there are others of far greater importance; as, for example, where there has been some malignant deposit in the body of the testicle itself.

There is yet another morbid condition of this gland, of so much importance in the prognosis, that I deem it necessary to mention it also. At its commencement it is so similar to cancer, that it is impossible to distinguish between them without the aid of the microscope. It is a fungous enlargement of the testicle, not at all malignant in its character. This fungous growth gradually protrudes through its proper envelopes; and when it has once begun, it goes on increasing, until the tunica albuginea gives way; the growth protrudes directly into the cavity of the tunica vaginalis testis; and, if let alone, it goes on increasing, until that cavity is enormously distended. The tunica vaginalis yielding, it reaches the integuments. These even may give way; and a fungus of this kind may thus protrude externally. I have seen such cases. There is no malignity connected with this growth.

There is a man in this city, for whom I was compelled to operate, by castration, for a fungus on one side. He returned, some time after, with the other in a similar state. I was about to perform the same operation; but he begged so hard, that I had to let him off. He got well, however; and I would remark, that, though the disease may not arrive at such a point as to render castration necessary, yet this operation will often be preferred by the sufferer.

As regards cancerous deposits I would remark, that, though you may arrest the progress of the disease, for a time, by castration, yet, at some time subsequent, sooner or later, it will return in some other part of the body, and finally destroy the life of the patient.

I have thus mentioned to you some of the circumstances, which render it necessary for the surgeon to perform one of the most serious operations that he can ever be called upon to execute, for the deprivation of the *testes* seems generally to deprive life of every object.

Where you have determined upon castration, there are several modes of operating presented for your choice. But I do not deem it necessary to dwell upon them all; and shall therefore explain to you at once, the one which I prefer. Seizing the tumor in the palm of the left hand, and drawing the integuments back, begin an incision below the inguinal ring, and carrying it down to the cord, let it reach as far as the lower portion of the tumor. Isolate the cord from the surrounding parts; take it in the fingers, and search for the vas deferens; which will generally be found behind, and which may be known by its hard feel. Having isolated this, take a curved needle, armed with a strong ligature, and plunge it between the vas deferens and the other structures of the cord. Enclose the latter in the ligature, and then divide the cord below the ligature; the loop of which ought not to remain longer than two or three days. By this expedient, you will avoid all risk of hemorrhage, and also the necessity of searching for the artery after the cord is divided; when it becomes very difficult to find it, from its retracting into the gelatinous structures which surround it.

This operation can be accomplished in a very few seconds. In fact, I do not know but that the expedient of Koch is the best. He, having raised the cord above, with the integuments, swipes off all at once.

After the testicle is removed, we bring the wound together, and heal it, partly by the first intention, and partly by granulation. There is one condition, however, which sometimes results, and which also occasionally follows the operation for hydrocele by incision and excision. I allude to *tetanus.* After performing this operation, therefore, you should be always very careful and watchful.

We shall now leave the testicle for the present, and proceed to a kindred organ, the *penis.* We find that this organ is remarkably prone to take on some diseases, which are also common to other organs.

Here, in the first place, let us speak of two affections of the prepuce. The first of these is

Phymosis,

An unnatural elongation and contraction at its orifice, which becomes so small and rigid, that the prepuce cannot be drawn back. This gives rise to great inconvenience, for two reasons: first, because the secretions, being retained, become so acrid as to cause inflammation, ulceration, and sometimes even sloughing of the prepuce; secondly, because the orifice becomes so small, that the urine cannot flow freely out. This distends the prepuce like a sac, or bag, and may give rise to great uneasiness.

. In a case of phymosis, then, it is necessary that the surgeon should attempt some relief. Several operations have been proposed. The simplest is, to make several incisions on the inner surface of the prepuce from within outward, not extending through the skin. Another method is, to introduce a grooved director, on the median line, between the prepuce and glans penis, and carry it back till its point reaches the end of the cul-de-sac formed by the mucous membrane; then to pass a sharp-pointed bistoury along the groove, to its end, bringing the point of the blade through the skin; and to slit the prepuce up, on the median dorsal line. Some prefer to use scissors. Should the simple incisions of the inner surface be preferred, just insert a director between the prepuce and glans penis; pass in a bistoury, and scarify, through the mucous membrane, not dividing the skin. Repeat this all around the prepuce, and you will find that a slight force will carry it back over the head of the penis. Order the patient to use emollient fomentations, and to draw back the prepuce, from time to time; and, when the cuts have healed, he will be well. This operation will nearly always succeed: though you will generally find, that the mucous membrane, in the dorsal operation, will extend beyond the skin; which it will, therefore, be necessary to divide afterwards. The deformity, at first, will be great; but very soon it will disappear, and all will appear as though perfectly natural. Some surgeons recommend two incisions to be made, one on either side of the frenum, instead of one through the dorsum. This is not necessary, and only gives additional pain. The other plan is all sufficient.

There are cases, however, in which, from pathological conditions of the parts, there will be no possibility of succeeding by the ordinary method. The reason of this is, that there is formed in the prepuce, and around the stricture, a *hard* and almost *horney* substance, which prevents the success of the operation. Here the only remedy will be circumcision.

There is also, in phymosis, another pathological condition. In this, the prepuce becomes *adherent* to the glans; and here it will be necessary, in addition to the main operation, to divide these bands of adhesion, and to prevent their reunion afterwards.

The second condition of the penis to which I have referred, is the reverse of the first, and is called

Paraphymosis.

The prepuce, being drawn back over the glans, becomes contracted; the glans becomes enlarged, swollen, and very painful; and, if the patient be not relieved, inflammation and mortification will result. In various inflammatory conditions of the penis—from chordee in gonorrhœa, for example—the vessels become so dilated, that, if the parts be not relieved from this constriction, they will speedily run on to inflammation and mortification. In ordinary acute paraphymosis, the mode of treatment is very simple. Having bathed the parts in warm water, so as to soften and relax the tissues, seat the patient before you, on a chair; then, press the glans firmly, so as to squeeze the blood out of its vessels, and, forcing the glans back with the palm, draw the prepuce forward with the finger and thumb. In acute cases of paraphymosis, you will frequently succeed by this plan. In chronic cases, however, where the great enlargement of the glans prevents the possibility of emptying its vessels, you can relieve only by an operation. Take an ordinary curved bistoury; pass it back under the constriction; and then divide it, taking care to avoid the *corpus cavernosum*. If *one* incision is not sufficient, you may make *two, or even more.*

ESSAY No. 10.

DISEASES OF THE GENITALS CONTINUED—URETHRITIS—GONORRHŒA—SEQUELÆ OF GONORRHŒA—IMPOTENCE—ORCHITIS—OPHTHALMIA—STRICTURE OF THE URETHRA—DISEASES OF THE PROSTATE GLAND.

Simple inflammation of the urethra, may result from several causes. In persons of weak and feeble constitution, or of strumous habit, very slight causes will give rise to it; as the passage of instruments, the presence of stricture, an unusually acid state of the urine, or perhaps sexual intercourse when the female is not in perfect health, though she may not be laboring under any venereal contagion.

The symptoms of this affection are, a burning or feeling of heat and distension in the urethra, followed by pain in making water, and a muco-purulent discharge, which is sometimes profuse.

The treatment should be moderately antiphlogistic. Saline purgatives, a bland diet, and strict abstinence from stimulants, will generally be all that is required; the disease subsiding in eight or ten days. As soon as the inflammatory symptoms begin to subside, soothing and mildly astringent injections should be used; solutions of opium, or of acitate of lead, will now give great relief. Should the affection become chronic, copaiba, used in small doses, has been highly recommended.

When stricture exists in combination with urethritis, the use of the catheter should be avoided, if possible. Here, leeches should be applied to the perineum, opiates and saline purgatives given, and the warm hip-bath frequently resorted to; diluent or demulcent liquids should also be freely drank.

If abscess, either about the urethra, or in the perineum, should follow this disease, warm emollient poultices should be early resorted to and constantly used, and the abscess be freely opened early, from without. If permitted to break internally, it is apt also to open externally, and so occasion fistulous openings, through which urine will constantly escape, and the curing of which will give much annoyance.

When the abscess is forming near the urethra, a sense of heat and pain, with slight swelling and redness of the part, soon followed by fluctuation, will sufficiently mark the seat of the collection. If forming in the perineum, the abscess will cause a sense of heat, weight, and deep-seated pain just in front of the anus. Slight redness will be observed, following the course of the urethra; but no fluctuation will be perceived until the abscess reaches the scrotum.

An early and free incision should be made, and if the pain and inflammation are great, leeches should be applied to the perineum. Should fistulous openings be formed, and communicate with the urethra, they will gradually close, if not accompanied by stricture. If they are not, their treatment should be the same as for fistula in the locality from any other cause.

Urethritis is very apt to be mistaken for gonorrhœa, and great care should be observed to avoid such a mistake. Indeed, the differential diagnosis is in some instances extremely difficult. The history of the case, the less violent nature of the inflammation, and the absence of all unpleasant sequelæ, furnish our only means of deciding.

Gonorrhœa.

Gonorrhœa, in its attack and progress, has been divided into three stages: those of irritation, of acute inflammation, and of chronic inflammation. The symptoms of the first stage manifest themselves generally between the third and eighth day after the contagion, though they sometimes are felt earlier, nay, in some cases, a moment or so after an infectious connection; this is, however, very rare. At this time a sense of heat and itching is experienced, followed by a peculiar sensation at the orifice of the urethra, which feels as though some small, hard body distended it. These sensations are soon followed by pain on passing water, and a red and swollen state of the tips of the urethra, the opening into which remains widely separated, or gaping. Indeed, the whole penis is slightly inflamed and swollen, and gives signs of irritation. At this period, if the course of the meatus be pressed upon, a little thin muco-purulent matter will exude therefrom. After a period, varying from twelve hours to three or four days, has elapsed, the second stage begins. The swelling, heat and pain of the parts now rapidly increase; the discharge is rendered abundant, and becomes quite purulent, and of a green or yellowish green color; and the ardor urinæ, too, is now intense. The inclination to pass water is constant; but the urine, though giving great pain, flows in diminished quantity, and the penis, particularly over the urethra, is quite tender to the touch, and swollen. When the inflammation reaches the bulbous portion of the tube, a feeling of uneasiness will be perceived in the perineum; and if the disease still extends and affects the prostatic region, a sense of heat and discomfort will be observed about the anus. From the excitement and tergescence of the parts, erections are apt frequently to occur, and they give great pain, as the membranous parts remain undistended, and the organ is hence twisted on its axis and bent forcibly downwards, so producing *chordee.* This painful accompaniment of this stage is most apt to come on at night. Considerable constitutional irritation is also apt to exist at this stage.

When the disease goes on, at the end of ten or twelve days, or, it may be, two or three weeks, the inflammation becomes chronic; and so the *third* stage begins. The discharge now becomes much thinner, and diminishes in quantity, while all the inflammatory symptoms are lessened. This stage may run on for a fortnight or three weeks, and then, if not cured, terminates by all inflammation subsiding in gleet. This consists of a very thin discharge, of small amount, but constantly existing, which may be kept up for months, or even years, and is generally very difficult of cure.

Surgeons differ widely in their views of the nature and tendency of gonorrhœa Some regard the affection as purely local, and argue that it tends, sooner or later, by exhausting itself, to a spontaneous cure, and will hence get well, even if no treatment be pursued. Others contend, that, while the disease is in its outset purely local, soon the constitution will be affected, and life be endangered by a constant impairment of health. There can be very little doubt that gonorrhœa, though altogether local at first, very soon becomes constitutional. How otherwise can we account for the peculiar eruption, the buboes, and other distinctly characteristic affections to which it gives rise? The contagiousness of the disease, too, appears to point to something more than a local effect; while the constitutional irritation which it originates and keeps up, is too great to be accounted for by the local disease alone. There is also too strong and well-observed a tendency in the disease to return, after every local manifestation thereof, is no longer to be accounted for, save upon the idea of constitutional taint. Gonorrhœa is extremely contagious in each of its stages. Indeed, as long as there remains the slightest discharge from the urethra, so long will the disease be certainly communicable.

The *treatment* of this disease must vary with each of its stages. In the first or irritative stage, the local use of emollient and soothing remedies will be advantageous. I have found great relief to be afforded by the use of an ointment of hogs lard and sugar of lead, applied over the entire glands and inflamed orifice and lips of the tube, the ointment being pressed as far into the urethra as its swollen lips and gaping orifice will permit, without using any instrument. Laxatives should be used during the day, and anodynes at night, and, with a strict abstinence from all stimulants, either as food or drink, will be all that is necessary or can be done in this stage. The method sometimes adopted, of attempting, by violent applications, to check the disease in its very commencement, has so signally failed, that it is now very seldom or never resorted to.

When the stage of acute inflammation has set in, the treatment, general and local, should be soothing and antiphlogistic. Purgatives should be freely given, and alkalies resorted to, to render the urine less irritating. Warm soft poultices, with the frequent use of tepid hip baths, and total abstinence from stimulants, make up, with perfect rest, the sum of treatment applicable in this stage, unless the inflammation should run very high, when the local use of leeches to the most inflamed parts may be followed by some relief. Rest is of the utmost consequence; and the recumbent position should be, as much as possible, preserved; nothing, more than this, will contribute to a rapid recovery. In the use of purgatives, those should be preferred that appear to exert some peculiar influence over the genito-urinary organs. Hence cubebs and copaiba have always enjoyed the greatest confidence, and are universally employed. They should be so used as to act freely on the bowels, and have been recommended in several forms. The copaiba may be given in capsules; but it is not then as efficient as when used pure in mixtures, or as an extract. In most cases, the copaiba should be preferred to the cubebs, because much less irritating. A very good and active method of using the copaiba is to combine it with burnt magnesia. This forms a paste, and, as advised by Erichsen, is thus prepared:—The magnesia is placed in a mortar, and rubbed up with as much oil of copaiba as will form a stiff paste; of which, about one drachm, in the form of a bolus, should be taken thrice daily. The same author gives a very convenient method of administering this oil with cubebs, in the form of an electuary, when it is desired to combine them. About half an ounce of powdered cubebs should be rubbed up with as much copaiba as will make a stiff paste; of this, the dose is one ounce three times a day. Combined with the internal use of these remedies, the local use of mildly astringent injections may now be resorted to with advantage; such as a weak solution of acetate of lead, followed by one of the sulphates of zinc, and, as the inflammation subsides, the cautious use of nitrate of silver in solution; whose strength should not be greater than one grain to the ounce. These injections should be discontinued as soon as the discharge has ceased; and great care must be taken, while using them, not to injure the urethra. A glass syringe, with a very smooth nozzle, is the best for the purpose, and should be introduced gently and with great care. During the injection, the penis should be held up, that the injection may descend as far as possible into the urethra.

Gleet, or *chronic gonorrhœa*, constitutes the third stage, and is decidedly the most obstinate and difficult of cure. This affection sometimes runs on, in spite of treatment, for years; appearing at intervals to be relieved, and breaking out again after some slight excitement or indulgence. Under these circumstances, the strongest astringent injections should be used; and as no one remedy will long continue to do good, the solutions of gallic acid, nitrate of silver, sulphate of zinc, tannin, &c., &c., may in turn be employed. The diet should be nutritious, but not stimulating; and it has been advised that all exciting drinks should be avoided. In the treatment of gleet, however, this opinion appears to deserve some modification; for I have found that in cases of long standing, where the patient is weak and enfeebled, the moderate use of those liquors which exert a strong influence over the kidneys, without producing great excitement generally, has rather a good effect than otherwise. My sphere of observation, however, not having been great in this affection, it must remain for a more extended trial to determine whether the opinion be correct or not. The discharge certainly gives evidence of a want of tone in the parts rather than of sur-excitation, and there is no pain or other symptom of inflammation. Why may not the urine, by the use of whiskey or gin in moderate quantity, becoming increased in quantity and of stimulating quality, by washing and exciting the parts, cause a cure?

In cases of very long standing it has been advised to introduce a full sized silver catheter from time to time. In one case of this kind that has come under my observation, the disease, after resisting for several years every other treatment, yielded rapidly to the use of the catheter. A large sized instrument, being well smeared with mercurial ointment, was directed to be introduced every third morning. It was used but twice, when the discharge ceased, and returned no more.

In every stage of gonorrhœa, great care should be taken to avoid all causes of excitement, both bodily and mental; and all sexual indulgence should be positively forbidden, as the slightest liberty in this respect will certainly augment the disease, or cause its return, if but recently removed.

In the *female*, the course and treatment of gonorrhœa differ but little from those in the male. The disease is generally less violent in women, simply because it is not so prone to extend along the urethra, and also because of the absence, in them, of the prostate, testis, &c.; inflammation of which organs, in the male, is the greatest cause of difficulty.

With women, the greatest source of difficulty exists in deciding upon the nature of the disease. When in the acute stage, the orifice of the urethra is seen to be inflamed, and also the entire mucous membrane of the labia: there is pain on making water; and the discharge is observed to proceed only from the membrane of the vagina. When the disease has become chronic, however, the case is very different; and it then becomes impossible to declare positively that any disputed case is or is not one of this disease. Under these circumstances any declaration of diagnosis should be very guarded.

The *treatment* should consist of injections of astringents, as advised for the second stage of the disease in the male; and, unless the urethra becomes inflamed, no constitutional treatment need be adopted, beyond keeping the habits regular, and avoiding stimulants. It is seldom that the urethra becomes much affected; but when this is the case, copaiba or cubebs, and the same course as recommended for gonorrhœa in males, should be resorted to.

Hemorrhage from the urethra, *phymosis*, *abscesses*, &c., &c., which sometimes accompany or result from gonorrhœa, are to be treated upon the same principles, as the same affections from other causes. Some of the consequences or sequelæ of this affection, however, require a more particular notice.

SEQUENCES OF GONORRHŒA.

Impotence—Orchitis—Ophthalmia.

One of the most serious consequences of gonorrhœa is that feeble state of the generative organs, so often found existing after a severe and prolonged attack, which causes seminal weakness or *impotence.*

This affection, while resulting from debility, is also accompanied, in most cases, by a diseased and irritable state of the prostatic portion of the urethra. Those suffering thus, find themselves totally unable properly to consummate sexual intercourse, and are hence always of a melancholy turn of mind, indeed often hypochondriacal; and, in some instances, the mind has become so much affected that suicide has been the result.

The *treatment* of impotence may be divided into the *general* or *constitutional*, and the *local.* The constitutional treatment will consist in the use of such agents as shall give tone to the system and improve the general health. For this purpose the different preparations of iron furnish perhaps the best means, care being taken to render the diet as nutritious, and the habits of the patient as regular, as possible.

The local treatment should consist in the early use of the cold hip bath, both in the morning and at night. Too much importance cannot be attached to this as a remedial means, for there is perhaps no agent that will assist more in giving tone to the affected organs, and restoring them to strength.

To relieve the prostatic portion of the urethra when diseased, the use of the nitrate of silver becomes necessary. Several methods have been suggested for conveying this salt, or its solution, to the seat of disease, but decidedly the most convenient and safest, is that recommended by Erichsen. This instrument consists of a silver catheter of full size, the end of which is pierced by a dozen or more small holes, and a stylet, the lower end of which is expanded to fit the tube of the catheter, and has a small piece of soft sponge attached to it. When the caustic is to be applied, the solution should be poured upon the sponge, which should then, with the stylet, be oiled and passed into the catheter. The catheter being then introduced into the urethra and carried down to the diseased part, should be carefully held there, while the stylet is pressed firmly into it, so as to squeeze the sponge and cause the caustic liquid to be pressed through the openings into the catheter, and reach the urethral membrane.

This operation generally causes great pain and a good deal of local irritation. It should not, therefore, be repeated oftener than once in eight or ten days, or until the irritation it caused, when previously used, has entirely subsided. In addition to these means, every effort should be made during the treatment, to keep the patient cheerful and to divert his mind from his disease. To effect this, lively company should be sought, relief spoken of as certain, and all sexual excitement or indulgence scrupulously avoided.

An *inflammation and enlargement of the testes*, sometimes occurs as a sequence of gonorrhœa. Sometimes the disease attacks one, sometimes both; but most generally one at a time is affected. It has been supposed that the gland on the left side is most liable to this inflammation, but more careful and extended observation proves that the disease attacks one gland just as frequently as the other. "Consecutive orchitis is generally supposed to occur more frequently on the left side than on the right, but statistical enquiries show the fallacy of this opinion," says Curling, in his work on the "Diseases of the Testes." The same author then gives an account of one hundred and thirty-eight cases, from different sources, of which seventy-eight were confined to the right side, and only forty-nine to the left, thus proving exactly the reverse of what was formerly believed.

The symptoms, course and treatment of the disease, differ in no respect from those of orchitis from any other cause, and shall not therefore be further noticed in this place. "The swelling of the testicle which occurs in gonorrhœa has nothing specific in its nature, nor is the constitutional influence of mercury necessary to its cure, &c." (Sir Astley Cooper on the Testes.) The disease may occur at any period after the setting in of a gonorrhœa, but is most frequently observed between the third and sixth weeks.

Perhaps the most serious affection that can follow a gonorrhœa is a severe and destructive *ophthalmia*, which sometimes occurs as the result of gonorrhœal conjunctivitis. This affection—fortunately a rare one—consists of a violent specific inflammation of the conjunctiva, extending rapidly to the cornea and globe of the eye, and resulting generally in the total loss of vision, the escape of the humors of the eye, and shrinking and collapse of the globe, caused by the sloughing of the cornea.

The *symptoms* are those of a most violent purulent ophthalmia, accompanied by a profuse discharge, and somewhat increased swelling of the conjunctiva of the globe. This may be distinguished from the purulent ophthalmia, by the very contagious nature of the latter, and from the fact of the former occurring in persons affected by gonorrhœa. From the rapid and violent progress of the disease, it seldom comes under the care of a surgeon, until the eye has been irretrievably injured. It may almost be said that an attack of gonorrhœal conjunctavitis is necessarily followed by loss of vision; for this is so generally the case, that a recovery forms rather an exception than the rule. The reason is, that, before aid is sought, the inflammation has generally reached the cornea, and the cure being at an earlier period difficult and doubtful, becomes then impossible. "Our prognosis will principally turn on the state of the cornea; if that should possess its natural clearness, the eye may be saved. If it should be heavy and dull, and more particularly if it should have assumed a white, nebulous appearance, consequences more or less serious, will inevitably ensue." (Lawrence on the Eye.)

The disease generally attacks but one eye at a time, and, if the other becomes also inflamed, is apt to be less violent and more readily cured in the second than the first. So severe is this affection, that but few recover perfectly after a violent attack, and the mildest forms, if not promptly treated, are followed by serious results. Lawrence mentions fourteen cases, in all of which vision was either lost or impaired. In nine, sight was lost, and the remaining five, only partially recovered. There is some difference of opinion among surgeons with regard to the *cause* of this affection ever being a constitutional one, some contending that it always originates from the local application of infectious matter directly to the eye; whilst others maintain, that it may originate from a gonorrhœal taint existing in the constitution. There can be no doubt, however, that gonorrhœal matter applied to the eye will give rise to this affection; and great care should be taken by those attending cases of gonorrhœa, and those suffering therefrom, to avoid the possibility of any discharge coming in contact with the eye, through the linen used, or from the hands. Neglect in this respect, has caused the loss of many an eye.

The *treatment* of this form of ophthalmia should be strongly antiphlogistic. Blood should be drawn from the arm freely, and its local abstraction pushed as far as possible. Locally, a solution of nitrate of silver should be used. Much difference of opinion exists, as to the strength of the solution that should be preferred. Lawrence advises the solution to be not stronger than *four grains to the ounce* of water; and Erichsen also prefers this method of using the caustic; while Heys and others advise a much stronger solution, or even the solid stick.

Such is the treatment to be pursued in the first stages of this affection. But when the cornea has sloughed, and the violent inflammatory symptoms have subsided, or the patient is weak and feeble, suffering perhaps from exhaustion, it becomes necessary to moderate this plan, or, in some cases, even to resort to a restorative and tonic treatment Every thing, however, must depend upon the stage at which the disease is first combatted. If taken in hand early and promptly treated, a fair share of success may be calculated on; but if permitted to run on for forty-eight hours, or more, the most judicious management will generally fail to produce a cure. With regard to the simple local applications for the removal of pain, perhaps those that will give most relief will be the cooling or cold lotions. Warm applications are preferred by some, and will often be found more soothing to the patient. So little importance should be attached to this, however, that the patient may be permitted to choose for himself, and sometimes the cold, at others the warm will be preferred.

As soon as active inflammation has been subdued, it may become necessary to change the treatment somewhat. Should the patient be weak and pale, and the discharge still profuse, generous diet, tonics, and the local use of astringent lotions, solutions of alum, nitrate of silver, diacetate of lead, &c., &c., will now be found advisable.

It has been proposed to relieve the chemosis in this affection, by making incisions through the sclerotic conjuctiva. This, the method of Tyrrell, is thus described by Lawrence, who quotes Mr. Tyrrell. "The patient was seated on a low chair and I stood behind him, so as to receive his head, when inclined backwards, against the lower part of my chest; I then carefully, and with as little force as possible, elevated the superior palpebra with the point of the fore-finger (as in the operation of extracting a cataract,) having the finger covered with a piece of fine linen to prevent its slipping; one of my pupils depressed the lower lid: next, with a fine cataract knife I divided the conjunctiva and the subjacent cellular membrane from the margin of the cornea, in a direction between the attachment, of the recti muscles; making two incisions in each of these positions, or eight in all; in passing the knife, its point was made to penetrate the membrane, just over the junction of the cornea and sclerotic, and the back or blunt part of the instrument was opposed first to the cornea, and afterwards, as the incision was extended, to the sclerotic." The object of this operation is, to relieve the distended conjunctival membrane, and though the theory upon which it was founded has been much contested, yet all allow that its practical effect is exceedingly beneficial.

A mild form of gonorrhœal inflammation of the eye, accompanied by bright redness and increase of the mucous secretion, is sometimes observed. This affection may be so mild as scarcely to cause any pain or difficulty; or it may be so severe as to resemble the purulent ophthalmia. In the milder cases, the local use of astringent solutions, particularly of the nitrate of silver, will be all that is required. In the severer cases, antiphlogistic measures become necessary; and where the inflammation progresses to such an extent as to resemble purulent ophthalmia, the same treatment will be advisable as is recommended for that affection.

Gonorrhœal inflammation sometimes occurs in the external tunics and iris. Here the parts are seen to be inflamed, the flow of tears is increased, and there is great intolerance of light. When the inflammation reaches the iris, that membrane becomes hazy, specked, or thickened in appearance, and may sooner or later become so much impaired as to destroy sight. General and local antiphlogistic treatment should be pursued, until the inflammation is checked; when blisters may be resorted to with advantage, and the local use of warm soothing applications be of service.

Stricture of the Urethra.

A narrowing, or partial closure of the urethra, by an approximation of its walls, or the formation of adventitious membranes, is not an unfrequent affection—occurring sometimes from a peculiarity of constitution, but more frequently as the effect of long continued or severe attacks of inflammation. This inflammation may be the result of gonorrhœa or some other cause.

Strictures have been divided into three classes; the *spasmodic*, the *congestive*, and the *organic*. To these some surgeons add a fourth class, comprising such cases as combine the spasmodic and congestive forms.

Spasmodic stricture may result from constitutional predisposition or some inflammatory attack. As exciting causes of this disease, may be instanced all those conditions by which general relaxation may be produced or irritability increased, and particularly repeated excesses in eating or drinking, or too free an indulgence of the passions. A stricture of this kind consists in the compression of the walls of the urethra, by the spasmodic contraction of the muscular fibres outside of its mucous lining. The affection supervenes rapidly after any exposure, or from either of those causes that are above spoken of as exciting; or it may accompany and increase a period of bad health. The symptoms come on suddenly, and as rapidly does the disease subside, under proper treatment.

The peculiar *treatment* required in this form of stricture, consists in a frequent resort to the warm hip bath, and the internal use of some anodyne and diaphoretic preparation; the Dovers powder in full dose is a very good one; and if the sufferings are great, enemata of laudanum, in some convenient vehicle, will afford much relief. All stimulants and exciting food should be carefully avoided, and the general health attended to; while the bowels should be kept open, and every exertion made to prevent an acid state of the urine. Should these methods fail, or appear only to give temporary relief, a silver catheter, of full size, should be introduced, and the operation repeated every third or fourth day, until the irritability of the urethra is relieved, and the spasm is cured. It sometimes happens, that the use of the instrument appears, even after having been several times used, to increase the urethral irritability. Under these circumstances, it should be dispensed with, and the constitutional treatment alone pursued.

It is generally advised to use wax or gum bougies, in this affection; but I have found, in all cases requiring the introduction of an instrument to relieve stricture, that a silver catheter, unless under peculiar circumstance, is more easily introduced, and causes far less irritation than a bougie; and in spasmodic stricture particularly do they appear to be preferable, as the spasms yield much more readily to the firm, constant, and gentle pressure of the catheter, than to the uncertain and wavering, or yielding pressure of an elastic and bending bougie. When the catheter is used, it should first be moderately warmed by immersion in warm water, and then well oiled.

The existence of *congestive stricture*, in addition to the symptoms of stricture generally, is accompanied by swelling and redness of the lips of the urethra, a slight, thin, or perhaps a purulent discharge, and indeed by a genuine urethritis. The sufferings of the patient under an attack of this kind are truly severe, and frequently are enhanced by a sense of heat and discomfort in the perineum and much uneasiness when going to stool.

Here, every thing should be done to improve the general health; the diet must be simple, the habits regular, and all excitement carefully avoided. Anodynes should be used, to allay irritation, as well as for their equalizing effect upon the circulation; and the urine should be rendered as bland as possible, by the free use of diluent liquids and alkaline preparations. Copaiba, too, in small doses, will be advisable where the congestion is great, or urethritis exists. Under this course, the stricture will generally yield, but is extremely apt to return again; indeed, it sometimes recurs from the slightest causes, after appearing to be perfectly cured. Where it does so return, the same course is to be repeated; and when the inflammatory symptoms have subsided, the cautious use of the catheter should be resorted to, and persevered in for some time. Under these circumstances, the instrument should be very gently introduced, and all force strictly avoided, as the membrane is easily lacerated, and, even when most carefully dealt with, is apt to bleed on the withdrawal of the instrument. Should the inflammation run very high, and great uneasiness about the perineum exist, leeches may be applied to that part, and great relief will be obtained from the frequent use of fumigations with warm vapour of water, or, where this is not convenient, the warm hip bath.

Organic stricture consists in the closure of the tube by adventitious formations. These may exist in the form of a membrane, sometimes hard and cartilaginous, stretched across the canal, and having a small opening through it; or it may be composed of threads or organic fibres, stretching from one point of the tube to another, and generally lying obliquely. This affection results from long continued inflammation of the parts, and owns, as its most frequent cause, neglected or repeated attacks of gonorrhœa.

This form of stricture generally comes on gradually, and when once formed, the opening there-through becomes constantly smaller, until perfect retention of urine is produced. The symptoms, at first, are but slight, and not generally noticed. A few drops of urine are at first retained; the calls to urinate become more and more frequent, and are increased at night, or after going to bed; some straining next becomes necessary; a slight discharge from the uretha comes on, and is soon followed by a sense of weakness. As the stricture increases, the urine, in passing through it, has its direction changed and its current divided, so as to assume different forms, and it may thus be twisted, scattered, or completely divided so as to flow in too distinct streams. The exertion necessary to force the urine away increases; the calls to pass it become more frequent, and the amount voided at each effort becomes less, till at last, with extreme exertion, difficulty and suffering, a few drops only can be forced to ooze through the stricture and drip away.

When a stricture is suspected, its existence may at once be ascertained by passing a sound or catheter through the urethra, when, if there is a stricture, the instrument will be arrested thereby.

Three methods of treating these strictures have been proposed; by dilatation, by caustic, and by division of the stricture. The principle upon which the first method—that by dilatation—has been adopted is, that while the stricture is temporarily removed by the introduction of instruments, and the patient thus quickly relieved from much suffering, the organic deposits are caused to be absorbed, in consequence of the pressure exerted upon them by the instrument in the tube, and thus a permanent cure is effected.

Some surgeons prefer the use of wax or elastic bougies, and others resort exclusively to metallic sounds or catheters. For the above reasons it appears that metallic instruments are best, and the greater amount of pressure they must exert appears rather to increase their superiority. As large an instrument as can, without violence, be pressed through the stricture, should be carried to the bladder, permitted to remain there for about five minutes and then removed. At the end of about forty-eight hours, the same operation should be repeated, but with an instrument one size larger; and so on, every second or third day an instrument should be passed and retained for a short time, the size of the instrument being constantly increased till as large a one as *the orifice of the urethra will easily admit*, can be passed with ease into the bladder. The interval between the operations may now be gradually increased, until they are completely discontinued. It will be advisable for the patient occasionally to use a full sized instrument for some time after his relief appears perfect, as otherwise the disease may gradually return after a long interval.

It has been proposed, (and instruments have been invented for the purpose) to effect the perfect opening of the stricture promptly, by forced dilatation. This method, however, first advised by M. Mayor, is not generally approved of, and is now but seldom resorted to. The slow and gradual process by which the resistance of the stricture is gently overcome, appears far safer, and, in most cases, will prove more expeditious than the other; for, it must be remembered, that while forcing instruments through the stricture, we are dealing violently with the urethra, the membrane of which is extremely sensitive and prone to inflame, and that the supervention of even a moderate urethritis will protract the sufferings of the patient and enhance them, by increasing his stricture and rendering it more difficult to cure.

When the closure of the meatus is so nearly complete that neither catheters nor bougies can be made to pass the stricture, the use of caustic or incision remains. Several methods of applying caustic to the stricture have, from time to time, been proposed, and the "porte caustiques" of Ducamp, Heurteloup and Amussat, have had their various advocates, and are ingenious contrivances. They are, however, rather too complicated, when the same object may be as well fulfilled by the much simpler method of Whately. A wax bougie of full size being well oiled, is passed down to the stricture, and the surgeon with his thumb nail dents it opposite the orifice of the urethra. It is then withdrawn, and another bougie of like size and length, having a small piece of potassa fusa—about the size of a mustard seed—fixed in a depression at its end, is similarly marked, and then passed quickly down the urethra until the mark lies opposite the orifice of the tube, when the bougie is firmly pressed against the stricture for the space of a minute, and then removed. The operation ought to be repeated every third morning, until a moderately sized instrument can be passed, when the cure may be completed by dilatation. After each application of the caustic, a slight thin discharge is apt to occur, but it requires no treatment.

The treatment by incision comprises two methods, one by dividing the stricture from within, with instruments passed down the urethra, and the other by incision from without, by cutting through the perineum to the seat of stricture, and through it. In the first method, few surgeons have ever operated with satisfaction, though numerous instruments for thus notching or cutting the stricture. have from time to time been invented and recommended. All of these act upon the same principle: a cutting edge is, by means of a canula, carried through the uretha to the stricture, then protruded, and caused to act upon it so as to divide or notch its edge.

The most recently invented of these instruments, and that at present most in vogue, was introduced by Dr. Pancoast. This consists of a curved canula, in which a cutting stylet, grooved on its back, fits. In using the instrument, a long fine piece of catgut is carefully insinuated through the stricture, into the bladder. The end of the catgut is then passed through the groove in the stylet, and hence through the canula. The instrument is then carried down to the stricture, (the canula gliding over the catgut,) and the stylet, protruded on the catgut as a director, is forced through the stricture, which is thus divided. When the catgut cannot be got through the stricture, it is advised, to place the same in the groove on the back of the stylet, and then, drawing it within the canula, to pass the latter down to the stricture; when the catgut should be protruded and carefully insinuated as far into the stricture as it will go: the stylet is next to be carried cautiously forward on the catgut, and the stricture thus partially divided. The catgut and stylet are then retracted, and the same process repeated until the entire stricture is divided. After the division of the stricture, the cure is completed by the use of bougies, as in simple dilatation.

The great difficulty in this operation is, that in cutting we are obliged to depend entirely upon manipulation, and are dealing with tender and sensitive structures lying altogether out of sight. The use of caustic, therefore, is now generally preferred; and where this fails, the external incision through the perineum becomes advisable. This operation is performed in two methods. The first, introduced by Mr. Syme, is applied to cases of long standing, obstinate, but pervious strictures, and consists in passing a grooved sound through the stricture into the bladder, and then making a section upon this from the perineum, down to the seat of stricture and through it. In the second method, which applies to ***impervious*** strictures, no sound or director is used, the surgeon attempting, without any such aid, to cut into the stricture, and beyond it, from the perineum.

The first operation—*urethrotomy*, or *perineal section*—is performed in the following manner.—A staff of medium size and grooved on its convex surface, is passed through the stricture, and the patient lying as though for lithotomy, the surgeon makes an incision directly through the raphe or middle line, about an inch long, and just above the anus. The incision must be carefully deepened, by slight successive strokes with the point of the knife, until the staff is reached. The point of the knife should then be carried directly into the groove, and if possible behind the stricture; which must then be divided, by carrying the knife forwards through it When the knife cannot conveniently be placed in the groove of the director behind the stricture, it must be placed in front thereof, and it becomes necessary to divide the strictures carefully from before backwards.

When no instrument can be passed into the stricture, and the use of caustic fails, the only resource left the surgeon is, to cut into and divide it without a guide. Here he must rely entirely on his anatomical knowledge; and, under the most favorable circumstances, he will find the operation difficult, dangerous, and tedious. A large sized catheter should be passed down to the stricture, and the patient lying as for lithotomy, the surgeon cuts into the urethra directly upon the point of the catheter, and then endeavors to cut through the stricture into the urethra beyond it. This is a bloody and extremely difficult operation, and one which is frequently found to be impracticable. It has been more than once commenced and left uncompleted, by expert and experienced surgeons. The stricture having been divided, the catheter is carried on into the bladder, left there for forty-eight hours, and then removed; to be introduced again every fourth day, until the parts have healed completely.

In these external operations, after the stricture is divided, the perineal wound should be closed by straps, and union by the first intention induced, if possible. The cuts will generally heal kindly and give no trouble. The last operation will be very rarely necessary, as it should never be performed or attempted while any other means may succeed. Before operating, the patient should always be placed under the full influence of chloroform, as it will be found, that while under the action of an anæsthetic, his stricture will often yield, and admit of a medium or full sized instrument being passed into the bladder, when, a moment before, it had been completely impervious to the smallest bougies or sounds.

In speaking of external section without a guide, Erichsen says: "Fortunately this operation is now scarcely ever necessary; with patience and under chloroform, the surgeon may almost invariably get a staff, however small, into the bladder; he then has a sure guide upon which to cut, and by following which he must certainly be led through the stricture into the urethra beyond it. In all cases, therefore, urethrotomy should, if practicable, be substituted for the division of the stricture without a guide."

Diseases of the Prostate.

Inflammation of the prostate—*prostatitis*—is generally the result of long continued inflammation of the urethra from gonorrhœa. It is accompanied by a frequent desire to urinate and much pain on the passage of water, and there is deep-seated pain and much uneasiness about the perineum. There is also considerable pain on the passage of fecal matter down the rectum, from its pressure while passing over the gland. The finger, when introduced into the rectum, at once discovers the enlarged and tender gland, and so renders the diagnosis sure.

The tendency of this form of inflammation is to the production of abscess, to prevent which, the treatment should be actively antiphlogistic. Cups and leeches should be applied to the perineum, warm anodyne fomentations used, and the warm hip bath frequently resorted to. Saline preparations and antimonials will also be found serviceable. When abscess forms, it will be accompanied by throbbing and rigors; and if the collection of pus is large, retention of urine will also be likely to occur. These abscesses most generally break into the urethra, though they may also open into the rectum, or point externally in the perineum. When the latter is the case, a dark brawny appearance, accompanied by hardness, is apt to be perceived in the perineum. This should be cut into, even before fluctuation can be perceived, as it is of consequence to open these abscesses early. The incision should be made directly in the mesial line, and if no pus can be found, the wound should be kept open by a dossel of lint, and poultices applied, so as to cause the pus to be discharged through the wound. In this way, an opening into the urethra or rectum may be prevented.

During an attack of prostatitis, retention of urine may occur, as the result of the enlarged and swollen state of the gland, or from the pressure of an abscess. Under these circumstances, it will be necessary to draw off the urine by the catheter. When using this instrument, let it be borne in mind, that the neck of the bladder may be very much elevated by the diseased prostate. A very long instrument should therefore be used; and, in passing it through the urethra, its point should be carefully kept in contact with the upper wall of the tube, as otherwise the orifice of the bladder may not be entered.

Inflammation of the prostate may also assume a chronic form. This is particularly apt to be the case in feeble or very debilitated constitutions, and, like the acute disease, is most frequently the result of gonorrhœa. In this affection there is, in addition to tenderness on examination through the rectum, a sense of weight in the perineum, &c., and also a morbid secretion from the follicles of the gland, causing a discharge, from time to time, of thick, ropy mucus. This viscid secretion may drip away, or be squeezed out during defecation by the matters descending through the rectum; or it may sometimes be thrown out, so as to resemble the ejection of semen.

In such cases, leeches should be applied to the perineum, cups to the same, and the warm hip bath freely used. Where there is a chronic enlargement of the gland, and much pain in passing water, copaiba in small doses, blisters to the perineum, and the use of tincture of bark, combined with that of the tincture of henbane and the liquor potassæ, have been highly recommended.

Hypertrophy, or chronic enlargement of the prostate, is of very common occurrence among the middle-aged or old, but is generally accompanied by such an enlargement of the urethra, and corresponding changes in the surrounding parts, as to produce no inconvenience, and, hence, really not to constitute actual disease. This, however, is not always the case; the enlargement sometimes goes on to such an extent as completely to prevent the passage of urine, so as, if not relieved, inevitably and rapidly to produce death.

The earliest symptoms of this affection are, the necessity of effort on passing the urine, and a lengthening of the period required to empty the bladder, whilst, after this is apparently done, an involuntary escape of a small quantity of urine occurs, on the first movement of the patient. Strings of mucus are next observed to be mixed with the urine, and this becomes dark-colored, and assumes a fetid, sour smell. If the affection be not relieved, the mucous membrane of the bladder will become inflamed, and the urine be rendered extremely offensive, and of a milky appearance, from being mixed with pus In examining by the rectum, the condition of the lateral lobes may be ascertained; while by the use of the catheter, the state of the urethra and middle lobe is discovered. In examining for prostatic disease, then, these two methods of exploration should always be combined.

In the treatment of this affection, such means must be resorted to as are calculated to allay irritation about the urinary organs. The urine should be rendered as bland as possible, by the use of diluents and alkaline preparations; and the use of henbane and copaiba, in small doses, will also be found advantageous. When retention of urine comes on, the catheter should be freely used; and, indeed, where the instrument is with great difficulty passed into the bladder, it may be advisable to pass into that viscus a gum catheter, and retain it therein until an instrument can easily be carried past the enlarged gland. Great care should be observed, in passing the catheter, to keep its point against the upper wall of the urethra, as above directed; and the urine should be frequently drawn off, as it is apt, otherwise, to become putrid, and thus occasion fatal typhoid disease.

Should the enlargement of the gland be so great that no instrument can be passed into the bladder through the urethra, two methods only of preserving life remain—forced catheterism, and puncture of the bladder. Each of these have been elsewhere treated of, and will require, therefore, no further notice in this place.

Calculi are sometimes found in the ducts of this gland. They generally exist in small numbers, and are of small size; though they sometimes attain considerable bulk, and have been found in great numbers. The disease is accompanied by a sense of heat, pain and discomfort about the perineum, and a discharge of mucus from the urethra. On introducing the catheter, it is felt to strike the calculus before entering the bladder. If the finger is passed into the rectum, and presses the gland upwards against the catheter, the stone will be more plainly perceived: indeed, it may sometimes be distinctly felt by the finger in the gut.

When stone exists in this position, the patient should be placed as in cutting for stone in the bladder. The gland should then be cut down to, as in the lateral form of lithotomy, and the calculus removed with the scoop or forceps. The wound should then be treated as in cases of lithotomy.

Malignant disease of the prostate occurs very rarely. It may be recognized by the symptoms of enlarged prostate being accompanied by the escape of bloody mucus, mixed with cancerous debris, from the urethra. The hard tumor formed by the gland may be felt through the rectum, and the general systemic symptoms of malignant disease develop themselves.

The treatment, here, can only be palliative and soothing, as the disease must necessarily prove fatal. T. S. W.

LECTURE LXVII.

CALCULUS IN THE BLADDER—ITS FORMATION—SYMPTOMS—TREATMENT OF LITHOTRITY—THE INSTRUMENT OF WEISS—THE INSTRUMENT OF JACOBSON.

We design, this morning, gentlemen, to treat of *calculus*, or *stone in the urinary bladder*. This is a subject which has always been regarded as one of the most important to be found in the list of surgical records. The difficulties of the operation were at one time regarded as so great, that physicians deemed it their duty to warn their pupils never to undertake it. But, although this is still regarded as one of the capital operations, yet, so divested of its terrors has it become, that it may well now be undertaken with as much collected calmness, and confidence, as an amputation of the leg.

The truth is, that when it is known *where* and *how to cut*, the operation of lithotomy is as easy as many others, attending the performance of which there is not so much eclat. In my opinion, where the individual possesses the requisite qualifications of a surgeon, the operation of cutting for stone is far less serious than is that of the extirpation of many *tumors* that are found *about the* *neck*. In cutting for stone, no important blood-vessels or nerves are destroyed, or severed. It is, then, only in the hands of the ignorant, and rash—those who cut in the dark, and are wanting in all preparatory knowledge; who, instead of entering the bladder, cut, helter-skelter, they knew not where—it is only, I say, in such hands as these, that this operation becomes dangerous.

But let us leave this digression, and return to an examination of the formation of calculus. Of what is stone, as found in the bladder, composed? We find it made up of elements, all of which are found in the blood itself. But I do not intend to speak of the chemical constituents of stone. Upon that subject, I can safely refer you to your able professor of chemistry, for information.

There are two seats of stone; the *kidneys* and the *bladder*. The urine secreted in the kidney, from some derangement in the relative proportions of its constituents, gives rise to various sediments: these crystalizing form *gravel:* this, passing on to the pelvis of the kidney, and there meeting a portion of mucus, or a clot of blood, concretes around it; and thus a nucleus is formed, around which the concretion of gravel continues, until we have a stone in the kidney. This, having attained a certain size, is pushed by the urine into the ureter, and finally passes into the bladder; sometimes giving rise, on its passage, to excruciating pain, which comes on in paroxysms. If the calculus is large, it may be arrested in the ureter for some time; but it will eventually be forced into the bladder; where it either remains, and enlarges, or passes off by the urethra, and the patient is relieved. By far the greater number of calculi arise thus. Sometimes they grow so large in the kidney, that they cannot pass through the ureter; and then they give rise to violent inflammation, and even sometimes to abscess.

The other point at which calculi may be formed, is the urinary bladder. Here also clots of blood or mucus may be the nuclei, around which the gravel, crystalizing, concretes to such an extent, sometimes, as to give to the stone an enormous size.

In some cases, both in the kidneys and the bladder, some two, three, or more of these stones are formed; and instances have occurred, in which *several hundred* have been found.

This being the method in which calculi are formed, I might go on to speak of their causes. But time will not permit this. I would only remark, therefore, that, as a general rule, their formation will be influenced by climate, water, the state of the atmosphere, mode of life, &c. Where water contains lime, it renders those who drink of it more liable to stone. This appears to be the result of universal experience. One circumstance, however, *appears* to contradict it. If we take the State of Maryland, we find that a great portion is of the primary lime-stone formation, and that a great portion is of the tertiary formation. Now, calculi are very common in that State; and about *two-thirds* of the cases come from the neighborhood of the tertiary formation, while *one-third only* are derived from the neighborhood of primary lime-stone formations. This is an apparent exception; but it only serves to strengthen the rule; for, throughout its whole extent, this tide-water region is underlaid by vast marl beds, from which the water becomes strongly impregnated with lime. You may suppose that the same thing would hold good here. But remember, that so far as the geological structure of this State is concerned, there is very little of the primary limestone formation, almost the whole country being of either the tertiary or granitic formation, so arranged in layers, that here and there it is underlaid by large beds of *carbonate of lime*. The water, however, is *not generally impregnated with lime*, because the springs and wells do not *sink deep enough* to come in contact with these beds of marl, and therefore remain unimpregnated by them. Hence, stone is of very rare occurrence in this State; so rare, indeed, that a surgeon in a pretty large practice may have occasion to operate for stone but once or twice only in his whole lifetime; and in these cases, it will generally happen, that the stone is of *oxalate of lime*.

The *symptoms* of stone may be divided into two classes: the *rational*, and the *physical*. These should be considered separately.

When a stone exists in the bladder, there are rational signs which almost always present themselves. There will be frequent calls to avoid the urine, this frequency depending on the amount of the irritation of the bladder. When it is not much irritated, the calls will be less frequent, and *vice versa*. After fatigue, after a debauch, or after any circumstance which may determine the circulation to that part, the calls will be very frequent and urgent; so much so, that frequently they cannot be resisted for an instant.

At particular times and under certain circumstances, these attempts to pass urine are attended by pain and effort. At first the urine flows freely and without pain, but soon the stone falls into the neck of the bladder, and pain and difficulty of passing urine come on; so that, though the patient may *begin* to pass his urine freely and comfortably, he will end his evacuation with pain and effort. Sometimes, when the calculus is small, it completely closes the orifice; so that, after flowing freely for a while, the urine suddenly stops, and the greatest effort cannot force away another drop. After awhile, the bladder is again distended by urine; the stone moves, and the patient can now pass his water. But he must go through the same ordeal again.

The rough surface of the calculus, coming in contact with the delicate lining membrane of the bladder, causes great irritation, followed by the secretion of a thick ropy mucus, which passes off almost in a galatinous state; and, where the irritation is great, pus may even be secreted, and it passes away, mixed, sometimes, with blood. The irritation may even be so great as to cause bloody urine to be discharged. On account of the great amount of pain, the patient generally seizes the glans penis or prepuce, and forcibly tugs at and pulls it. This is attributable to the fact, that wherever there is great irritation at one end of a tube, as at the neck of the bladder, or one end of the urethra, the pain will be felt at the other, as at the glans, or other end of the urethra. There are other rational signs, but I have not time to notice them all. I will add, however, that, even taking all of these signs together, they cannot give perfect certainty; for the same pain in micturition, the same sudden stoppage of the flow of urine, the same pain and tugging at the glans penis, may all be the result of other causes. So I repeat, that however strong the presumptive evidence from these rational signs may be, yet they leave us still uncertain, still in the dark. How then are we to be sure? We can only be certain by studying the *physical signs*; by *sounding* the bladder—an operation, which, if properly performed, clears up all doubt. Having placed the patient in a proper position, take an instrument known as the steel sound, oil it well, and introduce it through the urethra into the bladder, turning its point in every possible direction. Should there be a stone, the point will come in contact with it, and you will detect it at once by the grating, jarring feeling to which it gives rise. You will not always, however, be thus readily successful. When you fail with your patient in the recumbent posture, cause him to stand up. Should you fail then also, oil the index finger of the left hand well, and passing it high up in the rectum so as to avoid the prostate gland, press the tip forward towards the pubis, and examine thus, with the finger in the rectum, and the sound in the bladder. But still we may fail to discover the stone. Then place the patient on his hands and knees, with the buttock upwards, and examine in this position. Should you try all of these methods, and yet fail to detect the stone, while you still have reason to suspect its existence, you must not desist after one trial only; but, making the examination again and again, you will certainly find the stone eventually.

There is one circumstance which may prevent you from detecting the calculus, and to which I will call your attention. Under the influence of forcible distention, some of the mesh-like cells or cavities on the inner membrane of the bladder may be so enlarged, that the stone may fall into one of them, and thus be received into a little sac or diverticulum, leaving perhaps one portion still projecting into the bladder; or it may be contained entirely in this little cavity. Generally, however, it has one portion left free in the bladder. When a stone is thus encysted, it is particularly hard to find it, and when entirely encysted it becomes impossible to detect its presence with a sound.

Having discovered the calculus, the next question is, what must be done to give relief to the sufferer. Here we enter upon a wide field; and, did time permit, it would be very interesting to consider the whole subject of the treatment of this infirmity. But I must forego this pleasure, and pass it rapidly over, only remarking, that so far as regards the removing of the stone, the method is twofold. One plan of proceeding is to crush the stone in the bladder into such small fragments that it may be passed off through the urethra. This has been long regarded as the great desideratum, and many methods have been proposed, and various instruments invented, for this purpose. It was not, however, until the present century, that any of these have successfully accomplished this object; and however praiseworthy may be all of those who directed their energies towards the attaining of this end, yet it is to Civiale that we are indebted, for having first established the safety and success of the operation. I need not describe his instrument in detail. There are many others which I might mention to you. All, however, act upon the same principle. Among them, I will mention the instrument of Jacobson. It consists of a hollow silver tube, containing a steel loop worked by a screw, and so arranged that when the tube is introduced into the bladder, by turning the screw, the steel loop projects from it. By turning the instrument about, the calculus finally falls into the loop; when, by turning the screw in the reverse direction, the loop is drawn into the tube again, and the stone is crushed. The hardest calculi have thus been crushed, and a whole stone has been broken up at a single sitting. Take care, however, not to keep the instrument in the bladder too long, as inflammation of that organ may be the result. It might be necessary to repeat this operation of *lithotrity* one, two, ten, or twenty times. I would mention, also, the instrument of Weiss. This, instead of acting by a loop, consists of two rods of steel, one gliding along a groove in the other. The ends of both blades are turned slightly up, and one is perforated by an oblong opening. The other is solid, and both are serrated. This instrument acts on the principle of a cog-power, the upper or male blade, being drawn back by turning a small handle, which acts as a cog upon the long rack attached to the blade. The stone falls between the curved ends of the two blades; when, by the action of the cogs, it is crushed between them, the fragments passing through the opening in the lower or female blade, and thus preventing the risk of wounding the urethra, while withdrawing the instrument, by any fragments which may remain and stick out between the blades. I prefer the instrument of Jacobson. It is easier to find the stone with it, and it crushes it, when found, without any difficulty. There is no danger of its breaking, and even if it does, no difficulty will result from the accident. Being a closed loop, there is no risk of catching the coats of the bladder in it; while you might do so with the instrument of Wiess. It is necessary, in using both, to turn the instrument about, until the stone falls into it, being careful never to catch the bladder. As regards the condition of the bladder, whether it be empty or full, there is a great difference of opinion. Some request the patient to retain the urine for some time previously; and if he has not done so, they inject warm water before operating. I think it a matter of no consequence.

The removal of stone by the knife, or the operation of *lithotomy*, shall be spoken of in the next lecture.

LECTURE LXVIII.

LITHOTOMY—METHOD OF CELSUS—OPERATION OF FRERE JACQUES—OPERATION AS NOW PERFORMED—CALCULUS IN THE FEMALE.

It yet remains for us, gentlemen, in continuing the subject of yesterday, to speak of the second method of getting rid of stone. This we must do but briefly, as it would be impossible in one, or even in a dozen lectures, to discuss properly the various operations, or methods of cutting for stone.

Perhaps the oldest method of performing the operation of lithotomy, is that of Celsus. It is exceedingly simple, and in those classes to which it is adapted, it is also effectual. It consists in cutting on the grip, as we say, and its performance is limited to cases occurring among children. The child is seated on the lap of an assistant, with the legs drawn up. The index finger of the surgeon is then passed into the rectum, where it reaches the calculus, and bearing it down, causes it to press on the perineum, near the anus. Then, by a simple lunated incision in front of the anus, he cuts directly on the stone and turns it out. This operation is effectual; but there are cases, even among children, in which it will not do. It is rendered impracticable in adults, by the depth of the perineum.

At a very recent period, there appeared in France a bold and daring monk, known as Frere Jacques, who operated freely for stone. He knew nothing of anatomy. His operation was as follows.—Having passed into the bladder, an ordinary sound without a groove, by a bold stroke on the left of the raphe, he carried the knife to the sound, and, guided by this, into the bladder. The stone was then removed by the forceps; and this fearless fellow, having gone thus far, would say to his patient that he had removed the stone, and *would now leave the cure to God.*

It was doubtless this operation of Frere Jacques, that first led to the introduction of the grooved staff, which has ever since been used.

Having mentioned this piece of the literature of surgery, I would state, that, in cutting for stone, we operate on one side of the perineum, one side of the urethra, and one side of the bladder. Hence this is called the *lateral* operation. It is divided into two varieties; the *lateral* and *horizontal*, and the *lateral* and *oblique*. The latter is generally known as the *lateralized* operation; and it is the one which I prefer.

Before proceeding to discuss the manner of operating, I wish to lay down certain general principles, by which you should be governed in the lateral operation.

First, your incision in the perineum should be *full* or *large*; and, secondly, your incision in the prostatic portion of the urethra should be *small*, never extending through what is called the shoulder of the gland. The reason for this is, that in the natural state, a layer of fascia passes from the bladder to the pubis under the gland; and if you divide through the gland, the urine passes to this fascia, and, infiltrating in the cellular tissue, gives rise to serious consequences. It is important, then, not to cut through the gland, and also that the incision in the perineum should be free and large.

In making the first incision, you proceed as follows.—Place the patient on his back, with the feet in the palm of the hands, and the buttocks drawn to the edge of the table; carry a sound into the bladder; and confide this to the hands of an assistant; who, holding the staff in the right hand, should, with his left, lift out of the way the scrotum, penis, &c. The surgeon, seated on a chair of convenient height, commences the first incision at the raphe, about an inch and a half below the pubis, and carries it obliquely downwards and outwards, to a point half way between the anus and tuberosity of the ischium, and on a line terminating with the centre of the anus. Having made this incision, he passes the index finger of the left hand into the upper portion, and seeks the staff; which will be easily felt through the thin membraneous portion of the urethra. Having found the staff, he feels with the finger for the groove; and having found this, keeping the rectum down beneath the finger, he carries the scalpel above it, and piercing the membraneous layer of the urethra, places its point in the groove of the staff. Keeping the blade turned obliquely outwards and downwards, so as to avoid the rectum below, and the internal pudic artery on the outer side, he then presses it firmly against the staff, and carries it into the bladder.

Having laid down these general rules, I proceed to speak of the different instruments for, and the leading modifications of, this operation. In skilful hands, the ordinary long scalpel is as good an instrument as any other. Various other instruments have been recommended from time to time. Among them is the gorget of Hawkins; though this, however, has been almost entirely abandoned. After the incision has been made, the stone is removed by a pair of forceps carried into the bladder for that purpose; and I would here call your attention to one difficulty which may arise. The finger being kept in the bladder, the forceps passing on it as a guide, if carried too low, may enter the pouch between the rectum and bladder. Take care, therefore, always to direct the forceps high up near the pubis.

Besides this cutting gorget of Hawkins, we have a blunt gorget and shield; as, also, another modification of the same instrument, by Physick; which has again been modified by Gibson. By either of these instruments, you may readily enter the bladder, but they have been almost entirely abandoned by modern surgeons.

A far better instrument is that of Professor Smith, of Baltimore. Of all the methods proposed for entering the bladder by the perineum, that of Professor Smith is perhaps the best. His instrument is an exceedingly ingenious one; yet I must confess, that I deem the cap and wire superfluous. The great advantage of this instrument is, that having adjusted it, and introduced the sound blade into the bladder, by bringing down the second blade, the lancet passes through the perineum directly into the groove in the staff. By introducing the knife into the groove of this staff, it will be carried directly into the groove of the main staff, and so into the bladder. It is almost impossible for any one to fail in entering the bladder with this instrument. There is no danger of hemorrhage; and, in short, there is no instrument by which the operation can be more safely performed. Yet, for my own part, I think there are no instruments for entering the bladder for the removal of stone better than the common scalpel, and a sound with a deep groove. One who is accustomed to operating can thus, with perfect ease, carry the knife into the bladder.

The chief danger in all these operations is that of opening the rectum. When you operate, you should always see that it is previously emptied of its contents. I would here remark, that, if unaccustomed to operate, you may, after the first incision in the perineum is made, introduce a grooved director, and carrying it into the groove of the sound, pass it thus into the bladder; and then, introducing the knife into the groove, having withdrawn the staff, cut upon it, instead of on the main staff, thus using a straight staff. The operation can be thus very easily performed, without any risk of wounding the rectum. Some are in the habit of using a straight staff; and, when this can be introduced, the plan is a good one. But there is difficulty in introducing it, and frequently it can not be done.

All these methods of which I have spoken, propose to remove the stone by cutting first from without inwards. There are other instruments for this purpose, which cut from within outwards; as, for example, the *lithotome cache.* When this instrument has been fairly lodged in the bladder, the staff is removed; and the instrument being properly placed, the surgeon, by making pressure on the handle, causes the knife to leave its sheath, and makes the cut through the prostate by withdrawing the instrument. You may succeed very well with this instrument. It is proper to remark, however, that in some cases the calculus is so large, that the incision thus made will not permit it to pass. To prevent this difficulty, it has been proposed to make an incision on both sides, and so avoid dividing the entire gland, and yet give sufficient room. With this object in view, it was first proposed to use an ordinary gorget, made with *two cutting edges* instead of *one.* For this special purpose, Dupuytren was also led to invent the *double lithotome cache.* This instrument, being fairly lodged in the bladder, is turned so as to bring its convexity upwards, and then is withdrawn gradually, the hand being gently depressed, so as to cause the instrument to move in the segment of a circle. Here the incision is made on both sides, and thus more space is given for the removal of the calculus. I have used this instrument myself, and I have seen it used by others. There is one serious objection to it. The blades are very slender, and unless they are very sharp, they are apt to spring, and the incision will be too small. If proper attention be paid to this, however, you will succeed very well with it.

I might go on to mention to you a hundred or more different methods of cutting for stone. But time will not allow; and I will only now remark, that it has been proposed to enter the bladder by an opening above the prostate gland,—or even through it, at the fundus of the bladder,—from the rectum. Now, this operation is exceedingly simple, more so than any other; the removal of the stone by it is easier, and the danger to life is less. But here its advantages end; for after the stone is removed, you can not close or heal the wound, and the feces pass into the bladder, and the urine into the rectum. Thus the patient will be exposed to more inconvenience, than if the stone had been left in the bladder undisturbed. Another method that I must mention before I leave the subject, is the operation high up above the pubis. Some persons recommend this operation, and others condemn it. Though long opposed to it myself, I am free to confess, that from the very favorable accounts I have lately received concerning it, I give the preference to it over all others, when the subject is young. Having shaved the hair from the pubis, and having placed the patient upon his back on a table, and having passed a large curved sound to push up the fundus of the bladder, make an incision on the median line, extending from the pubis about an inch and a half upwards. This incision should pass through the skin and cellular tissue, to the tendons of the abdominal muscles. Next, carefully divide the linea alba, to the peritoneum, taking care not to wound that membrane: then, carefully distending the wound with flat hooks, plunge the knife, guided by the left index finger, directly into the bladder, at its anterior part; and, through the opening thus made, examine the bladder with the index finger, and remove the stone. Having done this, introduce a gum elastic catheter into the bladder; bring the wound together, and heal it by the first intention. The catheter should remain until the wound has healed. The only objection to this method is, the possibility of the urine infiltrating into the pelvic fascia; but, barring this, I must acknowledge, that this high operation demands preference over all others. When the stone is large, and can not be broken, this high operation is the only resource which is left us. In a case in which I had occasion, recently, to operate above the pubis, on account of the large size of the stone, the bladder was entered readily; but the calculus being very friable, when seized in the forceps, crumbled into numerous fragments, which occasioned much trouble. Infiltration, followed by sloughing and suppuration, took place, but the patient finally recovered.*

CALCULUS IN THE FEMALE.

In the female, calculus is of very rare occurrence, and appears generally to result from a deposite formed around some foreign body that has lodged in the bladder.

When, however, females are found suffering from stone—the symptoms of which are pretty nearly identical with those accompanying the same affection in the male—the calculus may be removed by extraction through the urethra, or by lithotrity.

In former times, when extraction through the urethra was decided upon, that tube was quickly and forcibly dilated, immediately before the extraction, by a small bivalved speculum. Great force was sometimes used, and where the stone was large, the mucous membrane was first notched or cut through, and the dilator then used. This proceeding was so generally followed by incontinence of urine, that it has been almost entirely abandoned; lithotomy, even, being preferred.

Since the introduction of the lithotrite, however, it may be affirmed, that cutting for stone in these cases, is quite unnecessary, and should not therefore be resorted to in any form. The female urethra is short, almost straight, very dilatable, and bears the introduction of instruments, generally, without inconvenience. By the persevering and gentle use of prepared sponge, &c., the canal may be so dilated, that large sized calculi may pass without the use of any instrument. Should the stone not thus come away, a small pair of forceps may be passed through the urethra, after it has been thus gently dilated, and the stone caught and removed entire, if it is not too large to pass through the urethra without wounding it. If its size is such as to prevent this, the *lithotrite* should be introduced, and the stone crushed; when the fragments will be easily removed. Let it be remembered, that the urethra may be so dilated without injury, in the female, as to admit of instruments being used of sufficient strength to ensure the easy crushing of the largest and hardest calculi.

Lithotrity is performed in the same manner, and with the same instruments, upon the female as on the male, the only difference being, that, in operating on the former, the hips should be kept slightly elevated, that a sufficient quantity of liquid may be retained in the bladder. ED.

INDEX.

A.

ABDOMEN, wounds about. 428; tapping of, 434.
Abdominal Aorta, ligation of, 338.
Abscess, 12 ; varieties of, 20; lymphatic, 24.
Air-passages, foreign bodies in, 418; abscesses about, 419; bursal tumors near, 419.
Amputation, generally considered, 244; specially considered, 263; of the fingers, 263; of the meta-carpal bone of the thumb, 264; at wrist-joint, 264; of fore-arm, 265; at elbow-joint, 265; of arm, 266; at shoulder-joint, 267; of the tarso-metatarsal joints, 268; through the tarsal articulations, 269; at the ankle-joint, 270; of the leg, 271; of the thigh, 273; at the hip-joint, 274.
Anastomosis, 302; aneurism by, 313; treatment of aneurism by, 344.
Anchylosis, 215, 223; treatment of, 228.
Aneurism, 310; varieties of, 310; ætiology of, 313; terminations and results of, 315; spontaneous cure of, 316; treatment of, 317; by anastomosis, treatment of, 344; arterio-venous, treatment of, 346.
Ankle-joint, amputation at, 270; dislocation at, 211.
Anthrax, 63.
Antiphlogistics, 4.
Antrum Highmorianum, diseases of, 404; opening into, 404; wounds into, 384.
Anus, artificial, 439; fistula of, 502; stricture of, 508; congenital malformations of, 508; prolapse of, 491; polypus of, 499.
Aorta, wounds of, 427.
Arteria Innominata, ligation of, 325.
Arteries, wounds of, 297; obliteration of, 299; collateral circulation in, 302; ligation of wounded, 305; application of ligatures to principal, 321; ligation of thyroid, 327.
Artenio-venous Aneurism, 310; treatment of, 346.
Artery, ligation of common carotid, 322; ligation of lingual, 328; of external carotid, 329; of external maxillary, 329; of subclavian, 330; of axillary, 332; of brachial, 334; of radial, 336; of ulnar, 337; of internal mammary, 337; of external iliac, 338; of common iliac, 339; of internal iliac, 339; of femoral, 340; of popliteal, 341; of posterior tibial, 341; of anterior tibial, 342.
Arthritis, from wounds, 214.

B.

Bedsores, 41.
Bladder, calculus in, 542; formation of calculus in, 543; operations for removal of calculus in, 546; puncture of, 431.
Bone Abscess, 238; treatment of, 243.
Bone, atrophy of, 233; exfoliation of, 234; fractures of, 137; inflammation of, 231; tumors of, 233; ulceration of, 234.
Brain, compression of, 361; concussion of, 359; hernia of, 369.
Bronchocele, 420.
Bowels, obstruction of, 441; scirrhus of, 433; wounds of, 432.
Bubo, 81.
Bubonocele, 450.
Buffy-coat, 2.
Burns, 109.
Bursal Tumors, 121, 419.

C.

Cæsarian Section, 443.
Calculus, 542; in the female, 552.
Cancer, 127; alveolar, 129; colloid, 129; encephaloid, 128; epithelial, 129; medullary, 128; melanotic, 129; scirrhous, 128.
Carbuncle, 63.
Caries, 234; treatment of, 241.
Castration, 519.
Chancre, 66.
Cheek, wounds of, 381.
Chopart's Operation, 269.
Circocele, 516.
Cold, effects of, 112; local anæsthesia by, 114.
Compression of the Brain, 361; epilepsy from, 367.
Concussion of the Brain, 359.
Cordee, 524.
Corns, 123.
Cranium, fractures of, 354; contusions of bones of, 353.

D.

Dessault's Bandage, 158.
Dislocations, generally considered, 193; varieties of, *ib.*; treatment of, 195; of lower jaw, 198; of clavicle, 199; of humerus, 202; at elbow-joint, 203; at wrist, 206; of phalanges of thumb and fingers, 206; at the hip, 207; of patella, 210; at the knee, 211; at ankle, 211; of the astragalus, 211; of the phalanges of the toes, 212; treatment of compound, 212.

E.

Ear, diseases of, 370; foreign bodies in, 373.
Ecchymosis, 282.
Ecraseur of M. Chassaignac, 125.
Ectropium, 396.
Emphysema, 424.
Empyema, 425.
Enchondroma, 136.
Enterocele, 450.
Entero-epiplocele, 450.
Entropium, 396.
Epiplocele, 450.
Epistaxis, 391.
Epulis, 406.
Eresipelas, 54; vera, 55; pseudo, or false, 59.
Eustachian Tube, catheterism of, 377.
Exostosis, 233.
Eyelids, wounds of, 380; operations about, 395.

F.

Face, diseases, wounds, &c., of, 380.
False Joints, 191; treatment of, *ib.*
Femoral Hernia, 449; anatomy of, 481; operation for, 484; operation for external, 487.
Femur, fractures of, 174.
Fingers, fracture of, 172; dislocations of, 206.
Fistula, in ano, 502; mucous, 383; recto-vesical, 505; recto-vaginal, 508; vesi-

co-vaginal, 506: salivary, 381; intestinal, 473.
Fore-arm, amputation of. 265.
Fractures, generally considered, 137; treatment of, 145; of bones of the nose, 148; of malar bone and zygoma, 149; of upper maxillary bone, 150; of lower jaw, 150; of the vertebræ, 152; of the sacrum, 156; of the clavicle, 157; of the scapula, 160; of the humerus, 162; of the bones of the fore-arm, 166; of the lower part of the radius, 169; of the bones of the carpus and meta-carpus, 171; of the phalanges, 172; of the os innominatum, 173; of the femur, 174; of the patella, 183; of the bones of the leg, 184; through the tarsal and meta-tarsal bones, 186.
Fractures, compound, 187; comminuted, *ib.;* compound comminuted, *ib.;* treatment of compound, *ib.;* treatment of compound comminuted, 189.
Frost-bite, 112.

G.

Gangrene, 31.
Gastrotomy, 442.
Gleet, 526.
Goitre, 420.
Gonorrhœa. 523; treatment of, 525; in females, 527; sequelæ of, 528.
Gums, tumors on, 406
Gun-shot Wounds, 287; treatment of, 284.

H.

Hæmatoma, 123.
Hare-lip, 398.
Head, injuries of, 349.
Heart, wounds of, 427.
Hematocele, 518.
Hemorrhage, treatment of, 302; treatment by ligature, 305; treatment by actual cautery, 309.
Hemorrhoids, 494.
Hernia, 449; causes of, 452; symptoms and diagnosis of, 554; reducible, 451; irreducible, *ib.;* incarcerated, *ib.;* strangulated, *ib.;* internal strangulated, 452; differential diagnosis of inguinal, 454; differential diagnosis of crural or femoral, 456; diagnosis of thyroid, 456; diagnosis of phrenic, *ib.;* general treatment of, 457; radical cure of, 459; symptoms of incarcerated and strangulated, 460; treatment of incarcerated and strangulated, 462; operation for strangulated, 464; operation in general, *ib.;* special operations, 473; operation for inguinal, 474; operation for crural or femoral, 484; operation for umbilical, 489; other forms of, 490.
Hernia Cerebri, 369.
Hernia Pulmonalis, 425.
Hip, disease of, 223; excision at, 227; amputation at, 275.
Hospital Gangrene, 43.
Humerus, fracture of, 161; dislocation of, 202.
Hydrarthrosis, 216.
Hydrocele, 510; congenital, 511; causes of, 512; diagnosis of, *ib.;* treatment of, *ib.*
Hydrocele of the Cord, 512; treatment of, 515.
Hyoid Bone, bursal tumor near, 419.

I.

Impotence, 528.
Incised Wounds, 276.
Inflammation, general consideration of, varieties of, &c., 1; products, consequences, &c. of, 9.
Inguinal Hernia, 449; diagnosis of, 454; operations for, 474.
Intestinal Hernia, 450.
Intestines, wounds of, 432; wounds of, in operation for hernia, 473; fistula of, after operation for hernia, *ib.*
Iritis, syphilitic, 93.
Ischiatic Hernia, 490.

J. K.

JAW, excision of upper, 402; excision of lower, 406; fracture of lower, 150; immobility of lower, 401.
Joints, diseases of, 213; wounds of, *ib.*; inflammation of synovial membrane of, 215; false, 191.
KNEE-JOINT, dislocations at, 211; excision of bones at, 272; fractures involving, 180.

L.

LARYNX, wounds of, 414.
Laryngitis, syphilitic, 91; treatment of, 103.
Laryngotomy, 417.
Leg, amputation of, 271; fractures of bone of, 174.
Ligatures, 305.
Lipomatous or Fatty Tumors, 126.
Lips, affections, &c. of, 397.
Lithotome Caché, 551.
Lithotomy, 548.
Lithotrity, 546; in females, 553.
Lungs, wounds of, 424; hernia of, 425.
Lymphatic Abscess, 24.
Lymphatic Tumors, 24.

M.

MALAR BONE, fracture of, 149.
Maxillary Bone, excision of superior, 402; excision of inferior, 406; dislocation of inferior, 198; fracture of inferior, 150.
Meatus Externus, foreign bodies in, 373; occlusion of, 371.
Medullary Abscess, 234.
Morbus Coxarius, 224.
Mortification, 31; varieties of, *ib.*; causes of, 32; symptoms of, 33; treatment of, 36.
Mucous Fistula, 383.
Myringitis, 375.

N.

NÆVI MATERNI, 313; treatment of, 344.
Necrosis, 235; treatment of, 241.
Neuralgia of the Face, 382.
Nose, wounds of, 383; affections of, 365; polypus of, 388; correction of deformities of, 393.
Nostrils, hemorrhage from, 391.

O.

OBSTRUCTION OF THE BOWELS, 441.
Œsophagus, wounds of, 415.
Olecranon, fracture of, 166.
Onychia, syphilitic, 103.
Ophthalmia, gonorrhœal, 530.
Orchitis, 518; after gonorrhœa, 529.
Oscheocele, 450.
Osteitis, 231.
Osteo-Chondrosis, 235.
Osteo-Elkosis, 234.
Osteo-Phyta, 233.
Osteo-Pyosis, 233.
Osteo-Sarcoma, 236.
Osteo-Sclerosis, 232.
Osteo-Spongiosis, 232.
Otitis, 370, 376.
Otorrhœa, 370.
Ovarian Cysts, 4.
Ovariotomy, 4.
Ozena, 385; syphilitic, 91.

P.

PALATE, cleft, 411.
Paracentesis, abdominalis, 434; thoracis, 427.
Paraphymosis, 521.
Parotid Fistula, 381.
Patella, dislocations of, 210; fractures of, 183.
Pelvis, fractures of bones of, 173
Penis, diseases, &c., of, 520.
Perineal Hernia, 450, 490.

Perineal Abscess, 523.
Periostitis, 237; syphilitic, 92.
Peritonitis, after operation for hernia, 470.
Phrenic Hernia, 450; diagnosis of, 456.
Phymosis, 520.
Physic's Tonsil Clippers, 410.
Piles, 494; treatment of, 496.
Polypus Ani, 499.
Polypus Nasi, 384.
Prolapsus Ani, 491; treatment of, 496.
Prostate Gland, diseases of, 539; calculus in, 541.
Ptosis, 397.
Pus, 10.
Pyæmia, 46.

R.

Radius, fractures of, 166; fracture of lower portion of, 169.
Recto-vaginal Fistula. 508.
Recto-vesical Fistula, 505.
Rectum, congenital malformations of, 508; stricture of, 500.

S.

Sacrum, fracture of, 159.
Salivary Fistula, 381.
Sarcocele, syphilitic, 94.
Sarcoma, 122.
Scalds, 109.
Scalp, wounds of, 349.
Scapula, fractures of, 160.
Scirrhus, 128.
Scrotal Hernia, 450.
Shoulder-joint, amputation through, 267; dislocations at, 202.
Skull, collections on, 351; fractures of bones of, 354.
Sloughing, 34.
Snake-bites, 293.
Spina-ventosa, 92.
Starch Bandage, or the Immovable Apparatus, 186.
Stings of Insects, 293.
Stomach, wounds of, 432.
Stricture of Anus and Rectum, 508; of urethra, 532.
Suppuration, 10; local effects of, 13.
Sutures, 280.
Synovitis, 215.
Syphilis, 65; primary, 66; consecutive, 79; secondary, 84; in infants, 94; diagnosis of primary, 69; treatment of primary, 70; treatment of consecutive, 80; diagnosis of secondary 86; ætiology of secondary, 95; prognosis of secondary, 99; treatment of secondary, 101.
Syphilitic, enlargement of the testicle, 94; eruptions, 88; iritis, 93; nodes, 92; periostitis, 92; onychia, 103; orchitis, 92; osteitis, 92; sarcocele, 94; ulcers, 89; warts, 80, 89.

T.

Telangiektasis, 313; treatment of, 344.
Testicle, affections of, 518; operation for the removal of, 519; cystic degeneration of, 515; syphilitic affections of, 94.
Thorax, wounds, &c., of, 413.
Throat, wounds of, 413; syphilitic affections of, 90.
Thumb, amputation of the meta-carpal bone of, 264; dislocation of phalanges of, 206.
Thyroid Hernia, 449; anatomy of and operation for, 489.
Tic Douloureux, 382.
Tonsils, hypertrophy of, 408; excision of, 409.
Torsion of Arteries, 309.
Trachea, wounds of, 414.
Tracheotomy, 417.
Trephining the Skull, 365.
Tubercular Syphilitic Sarcocele, 94.
Tumors, 112; innocent, *ib.;* adipose, 126; atheromatous, 117; bursal, 121; compound cystic, 122; encysted, 116; fatty, 126; fibro-cellular, 126; fibrous, 127; hæmatomatous, 123; mucous tubercle, *ib.;* pilo-cystic, 122; sarcomatous, *ib.;* warts, *ib.;* wens, *ib.;* ma-

lignant, 127; alveolar, 129; colloid, *ib.*; encephaloid, 128; epithelial, 129; medullary, 128; melanotic, 129; scirrhous, 128; semi-malignant, 134; cartilaginous, *ib.*; cheloid, *ib.*; enchondromatous, *ib.*; fibro-plastic, *ib.*; malignant fibrous, *ib.*; recurrent fibroid, *ib.*

U.

Ulceration, 24.
Ulcers, 25; treatment of, 27; fungous, 29; catamenial, 30.
Umbilical Hernia, 449; anatomy of, 487; operation for, 489.
Union of Wounds, 277.
Uniting Bandage, 167.
Urethra, stricture of, 532; abscesses in, 523.
Urethritis, 522.
Urinary Bladder, calculus in, 542; puncture of, 437.
Uvula, elongation of, 411; excision of, *ib.*

V.

Vaginal Hernia, 450.
Varicocele, 516; treatment of, *ib.*
Ventral Hernia, 450, 490.
Vesico-vaginal Fistula, 506.

W.

Warts, 122; syphilitic, 80, 89.
Wens, 122.
White-swelling, 216, 221.
Wounds, 275; simple incised, 276; process of healing, 277; treatment, 279; contused and lacerated, 282; punctured, 285; tetanus from punctured, 286; gun-shot, 287; treatment of gun-shot, 290; poisoned, 293; from rabid animals, 295; poisoned, from farcy and glanders, 297.
Wrist, amputation at, 264; dislocation at, 206.

[illegible] 238 [illegible]

LANE MEDICAL LIBRARY

To avoid fine, this book should be returned on or before the date last stamped below.

M31 Geddings,E 12962
G29 Outlines of a course of
1858 lectures on surgery, pre-
pared by Waring & Logan

NAME	DATE DUE